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Summary

Poverty is widespread in developing countries especially in the countryside where agriculture is the lifeblood of rural households. From agriculture sector they earn their livings and feed their families. These small poor households contribute to a major portion of the population and labor force. Despite of their significant role and valuable contribution to the economy and society, they. Infrastructure like paved roads, input and output markets, hospitals and schools are missing in the countryside of the developing countries. Moreover, the households have no or very little access to resources. Usually they remain in debt all over their lives. These naive households get inputs from input dealers with the promise to pay at the time of harvest of the crop. In return, the input dealer or supplier charges very high interest rates. Most commonly, the input dealer himself performs the marketing activities on behalf of the farmer and farmer being in debt, generally has no voice. The dealers or suppliers of inputs act as pests living on the famers, sucking their incomes. At one hand farmers get inputs at higher price and on the other hand, their produce is sold at cheaper rates by the lenders. Easy and uninterrupted access to the inputs can bring positive impact on their economic conditions but there is problem of limited or no access to resources as stated above. Farmers are poor and have no access to the commercial banks because commercial banks ask for the collateral. Mostly small farmers do not own any land and those who own, is usually too small to be accepted by banks as a collateral: making it almost impossible for small farmers to get credit from formal lending institutions. This way, farmers are compelled to seek financial help from input suppliers, commission agents or local money lenders at very high cost, causing negative impact on welfare.

In 1976, Muhammad Yunus founded Grameen Bank to help such poor and small farmers who have nothing to offer as collateral. Grameen bank financially supported the poor sector of economy, who previously was neglected by the commercial banks. There are several empirical studies which show the importance of microfinance as an effective way of helping small households. These studies show that microfinance is positively and significantly related to the household welfare, income generation, risk bearing ability, increase in physical assets and school enrollment of the kids.

In this study, we examined the role of microfinance on different aspects of rural households. We used cross sectional data of 407 rural households from Punjab Province of Pakistan. The data consisted of personal, household, farm level and locational information. We employed Endogenous Switching Regression Model and used Full Information Maximum Likelihood (FIML) estimator as proposed by Lokshin and Sajaia (2004) which is modified version of initial ESR approach introduced by Lee (1982). Lee's approach estimates the participation and outcome equations separately generating heteroskedastic residuals and is unable to estimate consistent standard errors without adjustments (Maddala, 1986). Given that on the basis of net benefits households self-select themselves into microfinance programs, ESR accounts for self-selection because of observable and unobservable factors affecting outcome. We also employed stochastic frontier model with translog form, which is more flexible than that of Cobb-Douglas and does not require any assumptions about the production constant elasticity or substitution elasticity between the inputs. The translog form does not impose a priori assumptions and allows data to indicate real curve of the function.

This dissertation takes into account the different development activities related to the microfinance participation of small rural households. We estimated the impact of microfinance on the lives of rural households. FILM, ESR results explain the determinants of participation in microfinance programs and impact of microfinance participation on welfare indicators like per head expenditure, poverty gap and severity of poverty. Results indicate that there is positive relationship between microfinance participation and welfare of the rural households.

As stated above, we calculated technical efficiency of farmers who participated in microfinance programs and those who did not participate. Results of the analysis revealed that there are number of factors like age, education, farm and family size, which affect the participation decision. Moreover we found that farmers who participated in microfinance activities were technically more efficient as compared to the farmers who did not participate.

We also estimated impact of microfinance participation on determinants of participation and impact on fertilizer use, yield and net-returns regarding cotton farmers of Punjab province of Pakistan. Results reveal that microfinance has a positive and significant impact on fertilizer use, yield and net returns.

The results reveal that participation in microfinance has positive and significant impact on per head expenditure, poverty gap and severity of poverty. These results confirm that microfinance is a powerful and effective tool against poverty and vulnerability and can be implemented in rural areas for the welfare and betterment of rural households of developing countries. The outcome of translog stochastic frontier production function reveal that microfinance participation helps increasing technical efficiency of small farm households.

From the results of this study we conclude that microfinance is a poverty combating tool. Microfinance helps small farmers to have access to resources, to diversify their income earning patterns, increase risk bearing ability and overall increases the welfare and betterment of the households. Not only in Pakistan but in other developing countries it can be employed to assist poor and small rural households. It is therefore suggested that governments and policymakers should include the microfinance into their rural development plans. Public and private sector banks and financial institutions should also promote microfinance activities to help farmers get rid of poverty and to improve their standard of living.

Zusammenfassung

Armut ist in den Entwicklungsländern weit verbreitet, besonders in ländlichen Gebieten, in denen Landwirtschaft der Lebensmittelpunkt der bäuerlichen Haushalte darstellt. Die Landwirtschaft stellt die Ernährungsgrundlage der Familien dar und sichert deren Lebensunterhalt. Ein Großteil der Bevölkerung und Arbeitskräfte leben in einkommensschwachen Haushalten. Trotz ihrer bedeutenden Rolle und ihres wertvollen Beitrages für die Wirtschaft und die Gesellschaft, verbringen sie in der Regel ein elendes Leben. Infrastruktur wie asphaltierte Straßen, Beschaffungs- und Absatzmärkte, Krankenhäuser und Schulen sind in den ländlichen Regionen der Entwicklungsländer kaum zu finden. Zudem haben die Haushalte keinen oder kaum Zugang zu Ressourcen. Nicht selten sind sie Schuldner über ihr gesamtes Leben. Die Familien erhalten ihre Inputs von Händlern mit dem Versprechen, zum Erntezeitpunkt des Getreides zu zahlen. Im Gegenzug verlangt der Händler oder Lieferant sehr hohe Zinsen. Der Händler übernimmt üblicherweise den Verkaufsvorgang selbst, der verschuldete Landwirt hat in der Regel kein Mitbestimmungsrecht. Die Händler oder Lieferanten leben auf Kosten der Bauern. Sie bezahlen auf der einen Seite einen höheren Preis für die Inputs und auf der anderen Seite, werden ihre Produkte zu günstigeren Preisen durch die Kreditgeber verkauft.

Ein einfacher und kontinuierlicher Zugang zu den Inputs kann positive Auswirkungen auf die wirtschaftlichen Verhältnisse der Landwirte haben. Allerdings ist das Problem des begrenzten Zugangs zu Ressourcen allgegenwärtig. Bauern in Entwicklungsländern sind in der Regel arm und haben keinen Zugang zu den Geschäftsbanken, da die Geschäftsbanken

nach Sicherheiten verlangen. Da die meisten Kleinbauern kein oder zu wenig Land besitzen, als dass es von den Banken als Sicherheit akzeptiert würde, ist es für Kleinbauern fast unmöglich Kredite von konventionellen Kreditinstitutionen zu erhalten. Auf diese Weise werden die Landwirte gezwungen auf finanzielle Hilfe von Input-Händlern, Kommissionären oder lokalen Geldverleihern zu überteuerten Preisen zurück zu greifen, mit negativen Auswirkungen auf die Wohlfahrt.

Im Jahr 1976 gegründete Muhammad Yunus die Grameen Bank, um Kleinbauern zu helfen, die keine Sicherheiten zu bieten haben. Grameen Bank unterstützt den einkommensschwachen Wirtschaftssektor, der zuvor von den Geschäftsbanken vernachlässigt wurde. In mehreren empirischen Studien konnte gezeigt werden, dass die Mikrofinanzierung ein effektives Mittel sein kann kleine Haushalte zu unterstützen. Mikrofinanzierungsmodelle haben eine signifikant positive Auswirkung auf die Haushaltswohlfahrt, das Haushaltseinkommen, die Risikotragfähigkeit, die Steigerung der physischen Vermögenswerte und auf den Schulbesuch der Kinder.

In dieser Studie untersuchten wir die Rolle der Mikrofinanzierung auf verschiedene Aspekte der ländlichen Haushalte. Wir verwendeten Querschnittsdaten von 407 ländlichen Haushalten der Punjab Provinz in Pakistan. Erfasst wurden die Daten auf persönlicher, Haushalts- und Betriebsebene in Kombination mit Standortinformationen. Als empirisches Modell wurde das Endogenous Switching Regression Model (ESR) und der Full Information Maximum Likelihood (FIML) Schätzer, wie von Lokshin und Sajaia (2004) vorgeschlagen, angewendet. Dies stellt eine modifizierte Version des ursprünglichen ESR Ansatz von Lee (1982) dar. Lee‘s Methode schätzt die Teilnahme und die Outcome Gleichungen separat, wobei heteroskedastische Residuen entstehen, die zu inkonsistenten Standardfehlern führen

(Maddala, 1986). Da die Entscheidungen der Haushalte am Mikrofinanzierungsprogramm teilzunehmen auf der Grundlage des wahrgenommenen Nettonutzens basiert, findet Selbstselektion statt, die mittels der Berücksichtigung der beobachtbaren und nicht beobachtbaren Einflussfaktoren auf das Outcome im ESR Modell bedacht werden. Zudem nutzten wir das Stochastic Frontier-Modell mit der translog Form, die im Vergleich zu Cobb-Douglas flexibler gestaltet ist und keine Annahmen über die konstante Produktionselastizität oder Substitutionselastizität zwischen den Inputs erfordert. Die translog Form erfordert nicht die Erfüllung vorgelagerter Annahmen und ermöglicht so die Abbildung der Daten in der wahren Form.

Diese Dissertation berücksichtigt die unterschiedlichen Entwicklungen des Mikrofinanzprogramms auf die Teilnahme von kleinen ländlichen Haushalten. Wir schätzten die Auswirkungen der Mikrofinanzierung auf das Leben der ländlichen Haushalte. Die Ergebnisse der FILM und ESR identifizieren die Einflussfaktoren auf die Beteiligung am Mikrofinanzprogramm und die Auswirkungen der Teilnahme auf Sozialindikatoren wie Pro-Kopf-Ausgaben, Armutslücke und die schwere der Armut. Die Ergebnisse zeigen eine positive Beziehung zwischen Mikrofinanzbeteiligung und der Wohlfahrt der ländlichen Haushalte.

Wie bereits erwähnt, berechneten wir ebenfalls die technische Effizienz der Landwirte, die Mikrofinanzprogramme wahrnehmen und diejenigen, die nicht teilgenommen haben. Die Analyse der Ergebnisse zeigte, dass es eine Reihe von Faktoren wie Alter, Bildung, Landwirtschaft und Familiengröße gibt, welche die Teilnahmeentscheidung beeinflussen. Darüber hinaus haben wir festgestellt, dass die Landwirte, welche an Mikrofinanzaktivitäten beteiligt waren, im Vergleich zu nicht teilnehmenden Bauern technisch effizienter produzierten.

Wir schätzten für die Baumwollbauern in der Punjab Provinz Pakistans ebenfalls die Auswirkungen der Mikrofinanzbeteiligung auf die Determinanten der Beteiligung und den Einfluss auf die Verwendung von Düngemitteln, Ertrag und Netto-Renditen. Die Ergebnisse zeigen, dass Mikrofinanzierung einen positiven und signifikanten Einfluss auf die Verwendung von Düngemitteln, Ertrag und Nettoerträge hat.

Im Allgemeinen zeigen die Ergebnisse, dass die Teilnahme an Mikrofinanzprogrammen einen signifikant positiven Einfluss auf die Pro-Kopf-Ausgaben, Armutslücke und Schwere der Armut hat. Diese Ergebnisse bestätigen, dass Mikrofinanzierung ein leistungsfähiges und effektives Instrument gegen Armut in ländlichen Gebieten ist und die Wohlfahrt ländlicher Haushalte in Entwicklungsländern erhöht. Das Ergebnis der translog Stochastic Frontier Produktionsfunktion zeigt, dass die Beteiligung an Mikrofinanzprogrammen hilft die technische Effizienz von Kleinbauern zu steigern

Aus den Ergebnissen dieser Studie schließen wir, dass Mikrofinanzierung ein potentes Werkzeug im Kamp gegen Armut ist. Mikrofinanzierung ermöglicht Kleinbauern den Zugang zu Ressourcen, um ihre Einkommensbeschaffungsmethoden zu diversifizieren, die Risikotragfähigkeit zu erhöhen und trägt zudem zur Wohlfahrt und zur Verbesserung der Haushalte insgesamt bei. Auch in anderen Entwicklungsländern können Mikrofinanzprogramme verwendet werden, um arme und kleine Haushalte auf dem Land zu unterstützen. Es wird daher vorgeschlagen, dass die Regierungen und politischen Entscheidungsträger die Mikrofinanzierung in ihre Entwicklungspläne für den ländlichen Raum aufnehmen sollten. Es bietet sich an Mikrofinanzierung auch in öffentlichen und privaten Banken und Finanzinstituten anzubieten, um die Landwirte aus der Armut zu befreien und ihren Lebensstandard zu verbessern.

List of acronyms

ADPB	Agricultural Development Bank of Pakistan
BRAC	Bangladesh Rural Advancement Committee
DAP	Di Ammonium Phosphate
ESR	Endogenous Switching Regression
FIML	Full Information Maximum Likelihood
FINCA	Foundation for Inter Community assistance
GB	Grameen Bank
GOP	Government of Pakistan
ICAC	International Cotton advisory Committee
IMR	Inverse Mill's Ratio
LIML	Limited Information Maximum Likelihood
MF	Microfinance
MFI	Microfinance Institutions
ML	Maximum Likelihood
NRSP	National Rural Support Program
OPP	Orangi Pilot Project

PRSP	Pakistan Rural Support Program
PPAF	Pakistan Poverty Alleviation Fund
SBP	State Bank of Pakistan
UN	United Nations
ZTBL	Zarai Taraqiati Bank Limited

Chapter 1

Introduction

1.1 Background of the study

Microfinance is considered as a development strategy in under-developed and developing countries aimed to uplift the poor and vulnerable segment of the population. Although there is no general agreement upon the effectiveness of microfinance and some studies suggest that it has no or even negative impact on the lives of the poor (Karim, 2001; Karnani, 2007; Maldonado and Gonzalez-Vega, 2008), the majority of scientists insist that it has positive impact on poverty alleviation, improving health conditions, school enrollment of the kids and women empowerment (Littlefield *et al.,* 2003). Several studies have shown the effectiveness of microfinance towards the capacity building and coping with economic vulnerabilities (Kaladhar, 1997; Khandker *et al.,* 1998; Zaman, 2000; Nabi, 2000; Khandker and Faruque, 2001 and Niumai, 2012) resulting in poverty alleviation, enhanced health conditions, school enrollment of the kids and women empowerment (Littlefield *et al.,* 2003). On the contrary, there are also studies suggesting no or negative impact of microfinance on the lives of poor (Karim, 2001; Karnani, 2007 and Maldonado and Gonzalez-Vega, 2008). On the other hand, there are advocates of microfinance who believe that it is a poverty combating instrument and there is also a group of researchers who suggest that it is ineffective and has no impact on welfare of the poor (Coleman, 1999; Aroca, 2001 and Masanjala, 2002).

This study is conducted to examine the impact of microfinance on household welfare in Punjab Province of Pakistan. Current study estimates the determinants of participation in microfinance programs and the impact of such participation on the welfare indicators. Technical efficiency of households with and without microfinance participation was also compared.

1.2 Problem setting and motivation

Majority of the population in the developing countries resides in the rural areas and mostly relies on the agriculture for their subsistence. According to the World Bank (2014), 69 percent of the population in least developed countries is living in rural areas whereas this ratio is 67 percent in South Asia and for 70 percent of this population, agriculture is the main source of income (Ravallion and Chen, 2007; Shultz, 1979; World Bank 2008). Agriculture is associated with poverty and vulnerability of the farm households in the developing countries in case of small scale farmers. Most of the small households in the developing countries are living below the poverty line due to several factors, including insufficient cultivated areas, low yield, old methods of production, lack of marketing and storage facilities (Schweigman *et al.,* 1990), lack of education, technical information and most importantly no or limited access to the resources like inputs and credit.

Development of rural areas and improvement of the economic conditions of the rural poor may have positive impacts on the overall economy (Cervantes-Godoy and Dewbre, 2010). Agriculture is an important sector of the economy; apart from producing food for the population, it contributes to the major portion of the GDP of many countries. Numerous

scientists and researchers have investigated the role of agriculture. Bresciani and Valdes (2007) found that agriculture plays a major role in declining poverty as compared to any other sector of the economy. Christiaensen and Demery (2007) stated that it is easier for the poor people to get more benefits from the economic growth as compared to the rich and proposed that economic growth has different effects on reduction in poverty across different sectors of economy. It was consequently confirmed by Ligon and Sadoulet (2008), who found that the poverty reducing power of agriculture declines, as the countries get richer. Agriculture helps (enables) a large proportion of the population to get rid of poverty and increases per capita income, thus, the development of agricultural sector is supposedy more important than that of the non-agricultural sectors (Schweigman *et al.,* 1990).

Agriculture involves the transformation of inputs such as seed, fertilizer, irrigation and labor into the yield. As stated earlier, land holdings are small, and mostly poor farmers do not own any piece of land and work as tenants. Large number of farmers own small portion of land whereas 2.5 percent of people own around 40 percent of the arable lands (World Bank, 2006). The title of the land plays a very important role in accessing the resources and entering the financial market (de Soto, 2000). However, in respect to the small farmers even though they have valid title and property rights, small size of their farm becomes an entry barrier for getting credit from the financial markets and formal banks. Microfinance is intended exactly to help those small farmers.

Microfinance is commonly used as an instrument to combat poverty and vulnerability. In the last few decades microfinance has made a remarkable progress in the rural economic growth and poverty alleviation and the expectations associated with it are still very high. It is composed of two words, micro and finance meaning small loans or trivial credit facilities

usually for the poor and deprived sector of the society. The history of microfinance starts centuries ago with the formation of informal saving and lending groups aiming to help people. The main objective was to keep the money safe for those who own and to help the ones who need. Later on, in the 15th century, there were pawn shops, which offered financial services and started charging markup in order to fulfill their operating cost. In the 18th century, there was Irish loan Funs System that was delivering microloans to the landless farmers. In the 19th century, Friedrich Wilhelm Raiffeisen introduced the idea of financial cooperatives, which gradually spread in Europe, North America and some developing countries reaching Latin America by the early 20th century. During 1950-1970, state financial institutions started agricultural credit lending to farmers and cooperatives at lower markup rates. In 1990s, the term microfinance was introduced as a replacement of microcredit which includes savings, insurance and remittances besides credit (Helms, 2006). During the last two decades, microfinance was found to be efficient in poverty alleviation.

There is no approved definition of microfinance but in general, most researchers coincide in that it is a provision of wide range of high quality financial services to the poor individuals, small-scale businesses and households (Helms 2006, Christen 1997), including the provision of small credits, savings, remittances and insurances. Access to the financial services facilitates poverty reduction (Dunford 2006, Morduch and Hashemi 2003) and results in increased household expenditure and school enrollment (Chemin 2008), helps in assets accumulation (Rutherford 2000), to diversify sources of income (Littlefield *et al.,* 2003) and hence smooth consumption (Gertler *et al.,* 2003).

1.3 Research problem

Since 1990s, microfinance has attracted attention of the scientific community when the scientists and researchers started evaluating the impact of microfinance on the lives of the impoverished people around different parts of the world. A study by Adam and Von Pische (1992) proposed that credit is not an effective tool for the betterment of the rural poor. Gulli (1998) supported this notion and suggested that the lack of access to the credit is not the only constraint towards welfare. On the contrary, Khandker (2005) conducted a study in Bangladesh and found that microfinance participation helps in poverty reduction at the village level, women participants benefiting more than their male counterparts.

Pitt and Khandker (1998) found similar results from research in Bangladesh using the data from three different lending institutes. Morduch (1998) argued that these results might be based on the benefits from selecting particular programs instead of microfinance. Moreover, Morduch (1999) found that microfinance has a positive impact on the poverty reduction and helps participants in self-employment activities, which ultimately increase the income. There are some studies which admit the role of microfinance in welfare of poor but claim that microfinance has failed to assist the poorest sector of the economy as microfinance does not uplift the poorest and vulnerable ones (Hulme and Mosley, 1996, Kiiru and Mburu, 2007).

Coleman (2006) found that richer and socially and politically influential households themselves decide the size of loan whereas small households are dropped out from the microfinance participation, as their loan size is too small to make any significant investment or loan portfolio of the organizations. The microfinance organizations and policy makers

neglected the main idea that this small loan can increase the poor households' income and help them overcome poverty. Aghion and Mordruch (2005) found that although microfinance can make a difference in the economic betterment of the poor, it could not be applicable to any case or any geographical location.

There is a large list of impact studies of microfinance on poverty, household income, gender empowerment, nutrition of infants, schooling of children, development of livestock, intra household decision making and ownership of resources, freedom from hunger and diseases, improved health and many more. These studies cover different regions of the world particularly Bangladesh, India, Sub-Saharan Africa and America, however microfinance in Pakistan is underrepresented and up to the best of our knowledge, comprehensive studies concerning the subject matter are very less in number and low in quality. Some of the studies about the impact of microfinance are discussed as:

Jaffari *et al.,* (2011) examined the challenges and prospects of microfinance sector in Pakistan. Data consisted of eighty questionnaires delivered to executives, having responsibility of key customer identification, analysis and operational activities, in four different MFIs (Microfinance Institutions) out of which, only fifty four responded, hence making sample size very small to derive results. Descriptive statistics and frequency distribution techniques were used for data interpretation. They concluded that government is giving due importance to the MFI sector in Pakistan, whereas staff needs training. Seventy percent of the respondents claimed that funds are being used for personal consumption instead of investment, and MFIs pay very little attention to the skill development of their clients, while the cost of microfinance is relatively higher than that of other financial

institutions. The issues of social welfare and impact of microfinance on the lives of poor people was neglected in this study.

Akram *et al.,* (2008) studied credit constraints and borrowing behavior of farmers in rural Punjab province of Pakistan and found that 77 percent of the farmers use agricultural land as collateral for loan and 44 percent consider the lack of collateral as a most constraining factor in obtaining credit from the formal sources. Probability of being constrained was positively and significantly determined by the operational holdings and value of the implements. Fifty percent of the respondents reported to get bigger credit, if offered. For some areas, the remoteness (>20 km) of households from the finance institutions appeared to be another kind of obstacle for the farmers in receiving the inputs. The constraints faced by farm households were described, however the overall welfare and demand of inputs were not discussed.

Khandkar and Faruqee (2003) examined the impact of farm credit in Pakistan using the data from the Agriculture Development Bank of Pakistan (ADBP), which provides about 90 percent of formal loans in rural areas, together with the farm survey data. It was found that 4 percent of the rural households account for 42 percent of formal finance, while the remaining 69 percent of households receive only 23 percent of formal loans in Pakistan. Moreover, they found that 5 percent of the formal loans finance the consumption and remaining 95 percent support the production: 88 percent accounts for the farm and 7 percent for the non-farm production. This study focused on the role of ADBP in providing the farm credit; however its effect on the rural households was not investigated.

Pitt and Khandker (1998) examined the impact of participation in three credit-based programs, BRAC, BRDB and Grameen Bank on labor supply, schooling, household

expenditure and assets for men and women in Bangladesh. The program credit was found to be more effective for the women participants. Moreover, they found that credit is not perfectly fungible within the household and as the point estimates by gender differ greatly, so the statistical tests reject the equality of men's and women's credit effects in women labor supply and women non-land asset cases but study did not address any overall impact on microfinance on the social and economic welfare of the household.

Kochar (1997) analyzed the participation of households in both the formal and informal credit sectors and reported that borrowing from formal sector is the function of household's demand for credit as well as the reservation cost of borrowing from both sectors. The reservation cost of the informal credit is less than that of the formal credit so it reduces the extent of the formal sector rationing. However, additional data on the informal credit transactions and on the lender characteristics, in particular, are necessary to establish this result thoroughly.

Carter (1989) used endogenous switching regression (ESR) model to analyze the productivity and differentiation impact of credit on the small farm food production in Nicaragua. The results were not enough to fully support the positive impact of credit on the production growth in Nicaraguan agriculture. A serious limitation of this study was the use of the subset of producers whose behavior might be expected to understate the impact of the credit.

The basic aim of microfinance is to eradicate poverty and vulnerability while providing high quality financial services to the poor. Microfinance, as generally misunderstood, is not only the provision of small loans (microcredits) to the impoverished farmers, businesses and self-employed, but also a provision of legitimate services to the

small scale clients in accordance to their diversified needs and demands which are usually not welcomed by the ordinary commercial institutes. The potential clients or beneficiaries of microfinance are the poor individuals, small-scale businesses, and agriculture based households, which all could not provide bankable collateral, repayment guarantees, legal and financial documents necessary for obtaining the credit (Fitch, 2008). Although there has been a sharp decrease of the poverty during the last three decades, around 1.2 billion people remain in extreme poverty (World Bank, 2013). The distribution of these extreme poor is uneven but most of them (around 80 percent) are living in Southern Asia and Sub-Saharan Africa (World Bank, 2015).

Keeping in view the mixed statistical results of different studies and the services of microfinance and poverty profile around the globe, there is a need to investigate the true impact of microfinance. This kind of research will contribute to the existing knowledge concerning microfinance. This study explicitly focuses on the impact of microfinance on the different aspects of poor and small rural households in Punjab province of Pakistan. Four main objectives of the study are closely related to the direct impact of microfinance on the participants' income earning ability, contribution to welfare and reduction in the poverty status of households.

1.4 Objectives of the study

As stated above, the general objective of this dissertation is to estimate the impact of microfinance participation on poverty alleviation and betterment of the small rural households of Punjab province of Pakistan; the specific objectives include the following:

1. To examine the impact of microfinance on per head expenditure, poverty gap and severity of poverty.
2. To estimate the impact of microfinance on technical efficiency of wheat farmers with and without microfinance.
3. To investigate the impact of microfinance participation on fertilizer use, yield and net-returns of cotton growers.
4. To suggest policy recommendation based on the findings of the study.

1.5 Significance of the study

This study is important for the governments and policy makers as it focuses on the different aspects of microfinance regarding its role in welfare of the rural households. There are several studies investigating the similar issues in Pakistan, but only a few have estimated the true impacts. There are studies which have implemented the data from a few Microfinance Institutions (MFIs) or across limited geographical regions, where microfinance programs were introduced by the particular MFIs.

The current study is different from the previous ones, as we did not take into account the customers of any particular NGO or MFI. We selected the study area basing on the percent population living below the poverty line. Four poorest districts of Punjab province of Pakistan were selected, and households were randomly interviewed regardless of the source of microfinance funding. This way, the present study describes the overall impact of microfinance on the lives of the rural households and not that of any particular MFI.

1.6 Scope and limitations of the study

This study focuses on the three different aspects of microfinance at the same time. We conducted a field survey and collected data to estimate the role of microfinance on the welfare status of the rural households. There are studies which have estimated the role of microfinance on different aspects of households but they were restricted to some NGOs or MFIs but this study has not taken into account any specific NGO or MFI. This study is different in aspect that it provides true impact of microfinance on the society. In other words, it gives a broad spectrum of the intervention. The limiting factors while conducting this study were time and resources. This study is restricted to Punjab province only. Still there are other provinces where further research is possible.

1.7 Structure of the dissertation

This dissertation investigates three different social and economic aspects of the farm households in Punjab Province of Pakistan with respect to the access to microfinance facilities and their impact. In Chapter One, we have stated the motivation, research problem and objectives of the study. Chapter Two is devoted to the literature review, Chapter Three covers the background of the study, gives a geographical description of the country and a brief introduction to the agriculture sector of Pakistan, poverty profile and some aspects related to the microfinance.

Chapter Four, which is a theoretical chapter, provides an overview of the conceptual frameworks and econometric models as well as the methodology used to estimate the impact of microfinance. In this chapter, our research question is conceptualized with the view point

of microfinance as an intervention for poverty alleviation and overall welfare of the rural households. It describes the impact evaluation techniques and challenges, which need to be considered in order to obtain valid results.

Chapter Five describes the procedure of household surveying and data collection. Individual, household and location information of the target sample is reported as well as salient features of the collected data.. Symbols, names and descriptive statistics of the variables are defined in this chapter.

The results and discussions concerning the microfinance participation are described in Chapter Six which is subdivided into three sections. First section describes the determinants of participation in microfinance programs and the impact of microfinance on per head expenditure, poverty gap and severity of poverty. Results revealed negative correlation between the age of the household head and the probability of participation in microfinance. Older farmers are less innovative and more inclined to the risk–averse behavior as compared to the younger ones, which appeared to be more likely participants of microfinance. Number of family members and school enrollment of kids are positively associated with the microfinance participation. It is perceived that more family members, more is the labor available for the farm practices and can help in improving yield. Variables such as non-farm participation, farm area and ownership of a tractor are negatively correlated to the microfinance participation. Enrollment in non-farm work provides better and regular income and bigger size of cultivated land in the same way possession of tractor represent stable/firm/… financial status of a household. Owing to the definition of the microfinance as a financial product aimed to support/assist the poor, it is expected that richer households would be less involved in microfinance. We estimated the impact of

microfinance participation on per head expenditure, poverty gap, and severity of poverty. The results showed that all these dependent variables have positive impact on poverty reduction.

Second section of sixth chapter describes the results of the microfinance participation impact on the technical efficiency of wheat farmers. It represents a comparison of technical efficiency of farmers who have and have not participated in the microfinance programs. Wheat is an important crop and accounts for about 60 percent of the daily food in Pakistan (Rehman *et al.,* 2014). Although Pakistan stands at the 8th position in the world in wheat production (Statista, 2014), it is not self-sufficient in wheat due to the low per acre yield (Noorka *et al.,* 2009). Our findings show that the age and education status of the farmers significantly affects the technical efficiency, which is in accordance with the human capital development theory. Moreover, we found that microfinance promotes the increase of per acre yield.

Third section of the chapter discusses the impact of microfinance participation on the fertilizer use, cotton yield and net returns. Cotton is the most important cash crop of the country and is grown largely in the Punjab province of Pakistan. It provides raw material for cotton industry, accounts for a major portion of export and significantly contributes to GDP. Our results indicated that microfinance participation enhances the fertilizer use and consequently results in increased yield and net returns. Education, non-farm participation, farm and household size are important determinants of participation in microfinance programs. Age, education, non-farm participation and soil quality positively correlate with the use of fertilizer. In addition to these, other variables contribute to the yield and net-returns, which will be discussed in details in the relevant chapter. In the end, Chapter Six

concludes the thesis and suggests policy implications. Chapter Seven describes the suggestions and policy recommendations based on the results and findings of our study.

Chapter 2

Review of literature

This chapter gives a brief review of microfinance. The literature on microfinance and its impact is very diverse. There is a long list of studies conducted in different parts of the world estimating different aspects of microfinance. We have divided this chapter into four sections. First section gives an overview of microfinance. In the second section positive impacts of microfinance are discussed. The third section examines some studies with negative or inconclusive results whereas the last section reviews the literature regarding credit or microfinance market failure.

2.1 Overview of microfinance

According to Bateman (2010), microfinance is the provision of small sized loans given to the poor for running their businesses or investing in income generation activities. The idea originated from Bangladesh to help poor people diversify their sources of income and become economically self-sufficient. Sometimes the terms microfinance and microcredit are used interchangeably as microfinance institutions were offering only microcredits initially and with the passage of time, they increased the volume of their services. Now a days apart from providing microcredit, MFIs offer remittances, savings and insurance. Littlefield *et al.,* (2004) suggested that apart from providing small loans, microfinance also provides banking

services to the poor and small scale customers who are usually rejected by the commercial banks. Hence microcredit is a sub segment of the microfinance.

The research in the field of microfinance on different aspect has already been done and the process still continues and as a result of numerous studies in the different parts of the world, microfinance is providing improved and quality services to the poor households. There are studies emphasizing that borrowing money for the consumption and investment is not only the need of customers. Instead they require other services. (Helms, 2006). As stated by Seibel (2006), financing poor to eradicate poverty is an old concept which started in Italy in 1720. These markup free loans were given to the poor to help them get out of poverty.

Today's microfinance was introduced by Prof. Muhammad Yunus in Bangladesh in 1970's. Yunus observed that poor women were being exploited by the informal moneylender who were charging higher markup rates and in return were buying their products at cheap rates. He advanced loans to small holder women who repaid after a period of time. From his experience he found that it is not that big amount of money which is needed by the poor to generate their livelihood (Islam, 2007). This idea led to the foundation of Grameen bank. GB started giving small loans to the poor people with low markup rates with 98 percent repayment ratio (Bateman, 2010).

The success of microcredit by Muhammad Yunus motivated other social activists to establish similar programs to help poor segment of the society. In 1970s, Bangladesh Rural Advancement Committee (BRAC) was established by Fazle Hasan Abed and Association for Social advancement (ASA) by Shafiq ul Haq in 1978. Both BRAC and ASA were aimed to help poor in getting rid of poverty and to create economic sustainability. Similar schemes were

introduced in different countries like Self Help Group in India (Fouillet and Augsburg, 2007), The Bank Rakyat Indonesia (Ledgerwoodbali, 1999) and Foundation for promotion and Development of Microenterprises (PRODEM) in Latin America as a result of microcredit movement. These institutions were providing credit facilities to poor.

In Pakistan, microfinances started in 1960s when GOP introduced subsidized credit schemes for the rural poor. Later on in 1980s, Orangi Pilot Project (OPP) was started in Karachi followed by Agha Khan Rural Support Program (AKRSP) and National Rural Support Project (NRSP). These two project were the main building block of microfinance in Pakistan and in 1999, both were providing 84 percent of the microfinance (MIFA, 2008).

Although microfinance sector has grown rapidly in Pakistan during the last two decades but still there is great potential and there are large number of farmers, micro businesses and entrepreneurs seeking for low cost financial aid. Keeping in view the domestic need, The State Bank of Pakistan (SBP) is promoting MFIs to expand their areas of operation from cities to the villages and remote areas. There are ten private microfinance banks serving the poor nationwide. Microfinance sector in Pakistan is serving 3.3 million customers with a portfolio of 73.3 billion rupees (GOP, 2015).

2.2 Positive impact of microfinance

The list of studies describing the success of microfinance as an effective tool for poverty alleviation, creating risk bearing ability is very long. Here we describe some of the studies.

Mosley and Hulme (1998) conducted a study in Bangladesh, Bolivia, Kenya, Malawi, Sri Lanka and India to estimate the impact of microfinance participation on income. Data consisted of clients of 13 microfinance institutions during 1991-1993. They found a positive and significant impact of microfinance participation on the incomes of poorest borrowers but this impact was not consistent in all MFIs. Similar results were found by Mosley (2001) in Bolivia where he included two MFIs from urban and two rural areas to evaluate the impact of microfinance participation on poverty. He found positive impact of microfinance participation on poverty reduction.

Mina and Alam (1995) in Bangladesh discovered that clients of microfinance have a tendency to increase their assets which is a sign of getting rid of poverty as ownership of material assets or resources indicates the level of richness. Their results showed that MF clients had on average 90 percent increase in their assets. These assets included business investments, investment in farming, livestock and housing. Dunn (1999), Khandker (1998) and Mk Nelly and Dunford (1998) in Peru, Bangladesh and Ghana respectively observed a positive relationship between microfinance participation and income of MF participants. They found that participants had higher incomes as compared to nonparticipants. A similar study was conducted by Abbasi, Sarwar and Hussain (2005) in Pakistan in Faisalabad city. They found that MF participation helps increase the income level of poor participants.

Chowdhury, Ghosh and Wright (2005) and Khandker (2005) found a positive impact of MF participation on poverty reduction. Latif (2001) found positive impact of microfinance participation on savings. Rehman *et al.,* (2001) also had similar findings. He conducted a research on clients of Grameen Bank and found that there was a significant increase in savings after the households had participated in microfinance programs. Dao (2001)

conducted a study in Vietnam and found positive impact of microfinance on income resulting in increased expenditure on family and schooling of kids. Similar results were found by Nguyen (2011) who also confirmed that microfinance participation has significant impact on savings and household spending. Maldonado and González-Vega (2008) confirms the finding that participation in microfinance helps school enrollment of the kids in Bolivia. Moreover, less are the chances for kids to quit schooling in case when the household is participating in microfinance activities for a period of more than a year.

Mosley (2001) studied the impact of four microfinance programs on poverty in Bolivia. Out of these four programs, two were in the rural and two in the urban area. In his research, he studied income and increase in assets for measuring poverty. His findings reveal that households invest in low risk businesses and returns on assets are also low. In both, rural and urban settings the microfinance had a positive impact on income and assets. Moreover he found that although microfinance is a poverty alleviating technique but most of the people who get maximum benefits from participating are the ones who are close to the poverty line.

Dunford (2006) found that access to microfinance is positively associated to increase investment resulting in increase in income. Participants of microfinance can diversity their sources of income and microfinance has positive and significant impact on asset accumulation and helps smooth consumption in case of sickness, low crop yield because of extreme weather conditions. Participants of microfinance are found to invest more in the education and health. Women participation in microfinance helps them to strengthen their economic condition and the effects of which are long lasting.

Annim and Alnaa (2013) estimated consumption expenditure for participants and nonparticipants of microfinance in Ghana. Their findings reveal that microfinance helps in

poverty reduction and there is positive impact of microfinance participation on client's per week spending. Quach (2007) in Vietnam also found that microfinance had a significant and positive impact on household welfare. They found increased per capita expenditure on both, food and nonfood items. Findings of Nghiem *et al.,* (2007) also confirmed that there was a positive relationship between microfinance participation and household welfare. They found that access to MF services helped household to increase their spending on education, food and entertainment and has a significant role in reducing the poverty status of the participants.

Mumtaz (2000) discovered that microfinance programs started with the intention for the betterment and wellbeing of female clients may have better consequences as these programs target women as clients. These poor women create half of the poorer and deprived section of the population. Focus on women may gradually move them out of poverty. Pit *et al.,* (2003) conducted a study in Bangladesh on three different MFIs and found a positive impact of MF participation on the household and this impact was more significant in case of female participation.

Kabeer (2001) analyzed the impact of microfinance program in Bangladesh, SEDP (small enterprise development program) and found that the number of female participants increased drastically as compared to male participants and the program had a positive impact on the income. Mayoux (2001) also found that participation in microfinance programs helped women empowerment in Cameroon. Holvoet (2005) found that there was a positive and significant of microfinance participation on decision making in South India suggesting that microfinance helps in increasing the women's decision making and bargaining power, giving them an opportunity to combat poverty and increase the welfare the of household.

Islam and Maitra (2012) analyzed a panel data from Bangladesh during 1997 to 2005 and concluded that microcredit microfinance helps households to cope with the income shocks, helps in consumption smoothing and ensures households against income fluctuations. Baiyegunhi *et al.,* (2010) analyzed the data collected from 150 household heads Eastern Cape Province of South Africa. They estimated the household welfare by mean monthly household expenditure equivalent per adult. Their investigation brought some interesting findings that credit constraint household had significant and positive impact on savings and social capital but in case of household welfare, their findings were completely different. There was a significant and negative impact of being credit constrained on household welfare suggesting that MF participation is an effective tool against poverty and making welfare for the poor households.

Imai *et al.,* (2012) analyzed the role microfinance on poverty using cross sectional data from 48 countries. They found a negative and significant impact of microfinance loan portfolio on poverty. They confirmed that the amount of microcredit had a negative impact on poverty status of households. Moreover they found that microfinance not only decreases poverty but also has negative impact on severity of poverty.

2.3 Negative or inconclusive impact of microfinance

In the above section we presented some literature emphasizing on the positive impact of microfinance on different social and economic indicators. This section shows some studies which claim negative or negligible impact of microfinance on different aspects of the microfinance participants.

Coleman (1999) studied the impact of group lending in Northeast Thailand and found no positive impact of group credit (a form of microfinance) on education, asset creation, production and expenditure. The condition of the female clients was much miserable ending in debt cycle. The female clients who did not use credit facility wisely and spent the borrowed amounts in household domestic expenditure were enforced to make new borrowings from the informal money lenders at higher markup rates to pay back their previous loans. He concluded that microfinance is not increasing the welfare status of the poor section of the rural economy.

Aroca (2001) studied the impact of microcredit in Brazil and Chile. She evaluated the microcredit programs by the NGOs and banks and found that microcredit facilities given by the banks had positive and significant impact on the monthly income of the participants of the microcredit programs in Brazil. The results from Chile were quite surprising where microcredit participation in case of banks showed nonsignificant results on the income whereas in case of NGOs, the impact of microcredit programs was found negative.

Chavan and Ramakumar (2002) studied NGO led microfinance institutions in various developing countries and found them successful in reaching poor households. They found positive impact on the number of family working days but the impact on the wages was negative. Such microfinance programs have no impact on the skill development and technology adoption. Although MFIs have played an important role on employment and income generation but their impact is very small as compared to the profits they have created for themselves. The higher repayment rate in case of Grameen Bank (GB) is the result of high administrative cost which is recovered from the clients. Increases in the scale of operations may lead to withdrawal of subsidies and creating debt cycle.

Masanjala (2002) reported that in Asia although there are many success stories about the role of microfinance in poverty alleviation and household welfare but it could not get the same fame in Africa. He used the information from the household survey in Malawi conducted by the Foundation for International Community Assistance (FINCA). In this study, he found positive impact of microfinance participation on working capital, savings and expenditure related to business but found no impact on household expenditure and risk aversion. Moreover, high markup rate was negatively associated to the program impact and household welfare.

Amin *et al.,* (2003) conducted a study in Bangladesh using transactional data in two villages of Rajshahi district, collected over 12 months consisting of 793 households. They found that microcredit facilities were reaching consumption poor households but they did not find any evidence of microcredit reaching the landless households. Moreover they found that credit was not reaching the vulnerable households equally in the different locations. They finally concluded that subsidized credit facilities may have negative impact on the poverty alleviation. Similar results were found by Islam (2007) suggesting that the Grameen Bank failed to reach the poorest. Main emphasis of GB were the customers closer to the poverty line who were moderately poor or vulnerable non-poor.

Weiss and Montgomery (2005) conducted a survey in Latin America and Asia and in their findings, they described that microfinance is not reaching the primary poor who deserve economic help from microfinance services. These individuals or households fail to get into microfinance programs. Hence the impact of microfinance gives biased and inconclusive findings which are inefficient for policy making. Coleman (2006) examined the impact of two microfinance programs in Thailand and found positive impact on household

non land assets, savings, debt, lending. Agricultural, Livestock production and sale but also remarked that microcredit is not reaching the poor. In contrast to the poor households, wealthier households get more benefits from microfinance participation as it was easy for them to enter such subsidized programs on the basis of their influence.

Zaidi *et al.,* (2007) found that women empowerment was not significant after participation in microfinance programs in different aspects and even in some cases there was declined empowerment after joining microfinance programs. Pitt and Khandker (1998) in Bangladesh found that if credit was delivered to women, it had a positive impact on the health and nutrition status of girls and boys whereas there was no impact of microfinance on male participants. Khandker (2005) found that microfinance had a positive and significant impact on the welfare of extreme poor but in case of moderate poor, the impact of microfinance had not been of any significant importance.

Bechheti and Conzo (2010) studied the impact of microfinance on non-monetary issues like social recognition, life satisfaction and self-esteem. They collected information from 360 microfinance customers pertaining to three MFIs. They suggested that non income effects of microfinance are important to enhance the trustworthiness and of microfinance and may be helpful to achieve the monetary benefits of microfinance participation but they accepted that with the information they had, it was difficult to make inference about the non-monetary impact and hence there was no result from the study.

Thibbotuwawa *et al.,* (2012) in Sri Lanka found that participation in microfinance was significantly and negatively related to the income, expenditure and health of participants. Participants of microfinance were significantly worse-off than nonparticipants. Nghiem *et al.,* (2007) also found that participation into MF programs had a negative impact

on spending on medicone and doctors in Vietnam. Whereas Crepon *et al.,* (2011) found no impact of microfinance on average consumption in rural Morocco. They analyzed the data comprising of information collected from over 5000 household. Their findings revealed no significant impact on schooling of kids and women empowerment. They did not find any positive impact on the investments in business activities suggesting that microfinance has no impact on the poverty status of household.

Khandker and Samad (2013) estimated that real per capita income of the participants of micro finance doubled in twenty years whereas the increase in the real per capita income of the nonparticipants was 125 percent: higher than that of participants, showing negative impact of participation in microfinance on per capita income. Waelde (2011) found similar results in India. He found that microfinance had negative and significant impact on household private and business expenditure in case of both poor and better-off participants. Almost similar results were found by Abou-Ali *et al.,* (2009) in Egypt. They found that nonfarm per capita income was higher in case of participants of microfinance programs only in urban areas, whereas in rural areas the situation was drastically insignificant. Microfinance participation had no impact on the income, expenditure and poverty level of the participants.

2.4 Imperfect credit/ microfinance markets

Aleem (1990) found that in Pakistan farmers are credit rationed. Among the respondents, 55 percent of households having 5-8 acres of land and 43 percent owning 9-12.5 acres reported that financial institutes provided about half of their needed loan for agriculture. Moreover the study found that households utilize their borrowed amounts in

non-agricultural uses. Financial institutions do not focus on the small farmers with little or no land holdings.

Mohiuddin *et al.,* (1993) found that women are discriminated in the loan market. In developing countries, women being poor and having no material assets to be offered as collateral are usually credit rationed. Formal lending institutions mainly focus on large loans to be given to male farmers who have title of land operate on large scale agriculture. Schrieder *et al.,* (1996) also found negative impact of imperfect credit market. They conducted a study in Sub Saharan Africa for about one year. They found that market for credit is imperfect and if there are perfections in the credit market, it can lead to poverty reduction, increase in income and may ensure food security.

Buckley (1997) studied the impact of microfinance on households in Ghana, Kenya and Malawi. He argued that indicators like high repayment rates, financial sustainability and outreach actually do not represent the impact of microfinance on the lives of its poor clients. He concluded that microfinance alone is not sufficient tool for the eradication of poverty unless coped with changes in technology.

Khandker (1997) pointed out some slacks in Indian credit market. He found that participation of poor in the formal credit markets is very limited. Imprudent interference of influential landowners, politicians and government policies neglecting poor farmers are the major reasons which drive away the poor households from the formal credit markets. Apart from these, time seeking procedures, higher transaction costs and legal requirements like availability of collateral, proper ownership of land and credit history are the factors that limit the participation of poor farmers in the formal credit market. Subsequently, poor farmers

find it easier to get financial assistance from the informal sector where they can get the timely del9ivery of credit with little or no legal requirements.

Khandker and Faruque (2001) conducted a study in Pakistan and concluded that formal and informal credit markets contribute towards development in rural economy. They found significant impact of formal credit on output, consumption and overall welfare but they also found limited access to credit by small households. Formal lending institutes consider large farmers as a better clients as they can offer collateral and there are less chances of default. As a result, 42 percent of the formal loanable funds are lent to 4 percent of the farmers who are usually big ones. On the other hand, 69 percent of the poor rural households receive 23 percent. This shows that the market for formal credit is imperfect. Formal loans given by Agricultural development Bank of Pakistan (ADBP) may have a positive impact on development of small households but they cannot get sufficient credit. Finally they conclude that ADBP is not cost effective as the default ratio is also very high.

Murray (2001) studied customer's satisfaction level in Bangladesh, Colombia and Uganda. He used data from four MFIs regarding Women's world banking and employed Likert's scale. He concluded that the clients of microfinance were more comfortable with faster processing time, low rates of markup and less requirements needed to get the loan. Moreover the satisfaction level was high in case where the loan amounts were bigger. Smaller the sum of loan, lower was the level of customer satisfaction. MFIs in order to satisfy customers' needs should increase the minimum amount of loan. Increasing loan amounts overtime after regular repayments were not favored by the customers.

Sajeda *et al.,* (2001) conducted a study in two villages from Bangladesh. The data consisted of information collected from 229 village households. They found that although

microcredit reaches poor but fails to reach vulnerable poor. Usually the clients of microfinance are non-poor or relatively poor but microfinance programs fail to reach extremely poor who are at the verge of hunger and deprivation.

Onyuma and Shem (2003) suggested that microfinance institutions alone are not sufficient for the eradication of poverty, instead they should collaborate with other NGOs and financial institutions to bring a positive impact on the lives of the poor. The aim of microfinance is not only to enhance the economic conditions but also it should build human capital. Microfinance schemes need to be attached with programs like family education, awareness about HIV control, sanitation and drinking water etc. first there is need to understand that poverty is a complex situation of unawareness and access to resources. The true impacts can be found by the provision of skill development and creating skilled labor and providing opportunities in addition to provision of microcredit.

2.5 Conclusion

In this chapter, we have reviewed the existing literature on microfinance regarding four different aspects: introduction of microfinance, positive impacts, negative or inconclusive studies and microfinance market related issues. By the review of numerous studies, we conclude that microfinance was initiated for the help of poor and vulnerable in getting them out of poverty and vulnerability. Professor Muhammad Yunus, started microfinance services to some poor village ladies who were compelled to sell their handicrafts to the lenders on cheap prices because those ladies were getting financial services from them and who in return were taking benefit of their poverty. Professor Yunus

helped those village ladies with small sum of money who later on returned the money while running their businesses successfully. The positive impact of this help was that the women got released from the vicious circle of borrowing and selling their products at lower rates. This was the start of modern microfinance which ultimately led to the idea of Grameen Bank (GB).

Muhammad Yunus was the founder of GB which started helping poor households, women, small businesses and individuals on very easy conditions and lower markup rates. The idea got popularity and was duplicated in different parts of the world. The salient feature of GB was to lend with collateral which made many of the poor to get financial assistance from formal institutions, who lacked the ownership of material assets.

With the increase in popularity and operations of the microfinance, researchers, policy makers and governments started taking into account of its effectiveness. Many researchers in different social, demographic and geological regions started investigations and now there are different schools of thought on the basis of effectiveness. Some researchers consider it as an effective tool for the welfare, others regard it as a poverty increasing intervention while some suggest that microfinance has no role of the welfare and betterment of the community.

Generally the conclusion we got from the review of literature is that although in some regions microfinance is not performing very well in getting poor out of poverty but there are some reasons like microfinance programs are not properly employed and there is no monitoring mechanism. In some studies we found that there was political and social influence in loan disbursement. The people who deserve the loans were discriminated and

the people who were better off or non-poor got the loans. In such circumstances microfinance could not play its role in getting poor out of poverty.

Some studies were MFI or NGO specific. They were likely to see the impact of the particular institution on the lives of the participants of a specific microfinance program. The success of such studies entirely depended on the quality of microfinance services and the attributes of the participants. Those studies in generally were unable to construct inferences on the entire population.

In the current research, we have taken into account the deficiencies we found in the existing literature. Our research is not limited to any particular MFI or NGO. We selected a vast area from Punjab Province of Pakistan on the basis of poverty and where there were different types of MFIs and NGOs active in helping people.

Chapter 3

Background

We selected Pakistan as our case study country on the basis of its balanced representation of microfinance interventions, prevalence of poverty, large number of small farm households and a well-developed agricultural system in the country. The choice of Punjab province for the underlying study was made on the basis of its maximum potential representation of the major socio-economic aspects of the country. Apart from these, we did not find any comprehensive study of this area. This chapter describes the explicit criteria for the selection of the country and specific location for this study. Moreover, this chapter gives a brief overview of geographical profile, agriculture, poverty status and brief history and introduction to microfinance and its prevalence in Pakistan.

3.1 Pakistan at a glance

Pakistan is a sovereign Islamic Republic which came into being on August 14, 1947. The history of Pakistan starts 5000 years back in the Indus Valley civilization (3300-1300 BC), which was a Bronze Age civilization (Possehl, 2002). According to Singh (2008), Pakistan is situated in the area where most of the Indus Valley civilization existed. Before separation in 1947, Pakistan was the part of Subcontinent, named as Hindustan and is the only country which was created in the name of Islam. This shows that religion is deeply rooted in the lives of its inhabitants. Religion has unfathomable imprints on the daily life, economy, law and

legislation, food, music, art, specially calligraphy and festivals. Azan from the mosques can be heard in all the country as 77 percent of the population is Muslim and remaining population is Hindu, Sikh, Christians and Atheists (Black, 2003). According to Malik (2006), the ancestors of the country were Indo European communities who lived there for millenniums. These ancestors included Persians, Aryans, Arab, Afghans, Turks, Greeks and Mongols.

3.2 Geographical profile of the country

Pakistan is a wonderland of mountains and deserts. It is situated between latitude 24 and 37 degrees north and longitude 62 and 75 degrees east covering an area 796,095 km^2 making it the 36^{th} largest country of the world. It is a multiethnic country situated in South Asia. It is located at a position of great geostrategic importance, sharing borders with China (523 km) in the northeast, Iran (909 km) in the southwest, Afghanistan (Durand line, 2430 km) in the northwest, India (2912 km) in the east and Arabian sea and Gulf of Oman (1046 km) on the south (ICIMOD, 1998). Pakistan has a very diverse geography starting from sea level at Arabia Sea in Karachi to highest altitudes of Karakoram with around 185 Million inhabitants (World Bank, 2014).

There are five main rivers in Pakistan. The Indus, being the longest river, Chenab, Jhelum, Ravi and Sutlej. These five rivers constitute one of the world's largest canal irrigation system comprising of 56073 kilometer long canals and 1.6 million kilometer water channels helping this system to irrigate 36 million acres of land (GOP, 2001).

Figure 3.1: Map of Pakistan

Source: en.wikipedia.org

Figure displays the map of Pakistan and its global position showing its neighboring countries.

3.3 Agriculture sector of Pakistan

As stated above, Pakistan has five major rivers and one of the best irrigation systems in the world. Agriculture is an important sector of the economy of Pakistan. This sector provides food to the population, provides raw material for the agro based industries and has a significant share in GDP and exports. The sector alone employs 43.5 percent of the rural

population and adds about 21 percent to GDP. During the fiscal year, 2014-15, growth of agriculture sector made up 2.9 percent (GOP, 2014). Cultural practices are usually performed manually and use of advanced farm machinery is not common. Despite satisfactory growth of the sector, low yield and high cost of production are the main causes for the low net returns to the rural households is partly due to asymmetry in land distribution. Large number of farmers are landless and work as tenants or sharecroppers and subsistence farming is very common. Around half of the farms are smaller than two hectares while 47 percent of farmers own and cultivate 12 percent of arable area (ADB, 2002).

3.3.1 Important crops of Pakistan

Pakistan's agriculture can be classified as a traditional one. Important crops include wheat, rice, cotton, maize and sugarcane which adds 5.3 percent to GDP and about 26 percent of the value added in agriculture. Several crops other than these are also grown in Pakistan which add 2.3 percent to GDP and 11.1 percent of the value added in agriculture. Apart from crop production, livestock is also an important ingredient of agriculture sector which accounts for 56.3 percent of agriculture at GDP per sector. In the year 2014, the production of cotton in Pakistan was 12,796 thousand bales. Cotton alone adds 1.5 percent to the GDP and 7.1 percent in agriculture. Production of sugarcane in the same year was 67,460 thousand tons adding 0.6 percent to GDP. Rice production was 6,798 thousand tons and maize and wheat production was 4944 and 25979 thousand tons respectively. Wheat is the most important agricultural crop in Pakistan. It accounts for 2.1 percent to GDP and is grown on area about 9,199 thousand hectares (GOP, 2014). Pakistan stands at the second position

around the world in buffalo milk production, fourth in cotton, fifth in sugarcane, mango and dates, sixth in chick pea and apricot, seventh in rice and tenth in wheat production (FAO, 2011).

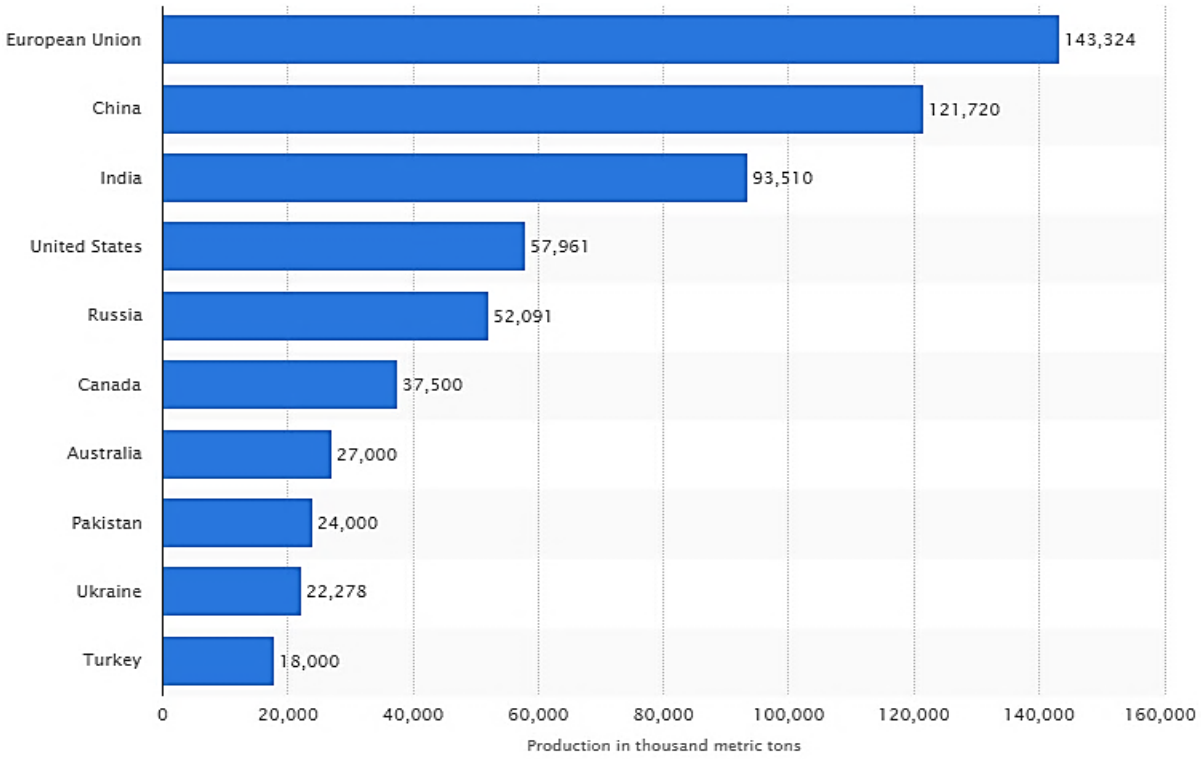
In this study we took into account the all aspects of agriculture including income from crops, livestock and poultry of household and analyzed the impact on welfare and poverty status using microfinance as an intervention in the first objective. In the second and third objectives we used the information pertaining to specific crops. We selected wheat and cotton crops because former is the staple food and is hence utmost important for the subsistence and the later on the basis of it commercial and industrial importance. The brief introduction and importance of both crops is as follows:

3.3.1.1 Wheat production in Pakistan

Cereal grains were domesticated about 8,000 years ago and they always played an important role in the history and lives of humans. Unlike the other types of agricultural crops, cereal grains have a very long shelf life and can be stored for years and can be transported without any transportation losses. Grains have always been the best solution against hunger caused by famine, low rainfall and adverse seasonal conditions and during the war.

Among the cereals, wheat is the most commonly sown and consumed cereal around the globe (Noorka *et al.,* 2013). Wheat is sown in a large number of countries including the European Union, China, India, Russia, the USA, Canada, Pakistan, Ukraine, Turkey and Iran etc. Figure 3.2 shows the projected top ten wheat producing countries in the world.

Figure 3.2: Projected leading 10 wheat producers worldwide in 2014/2015



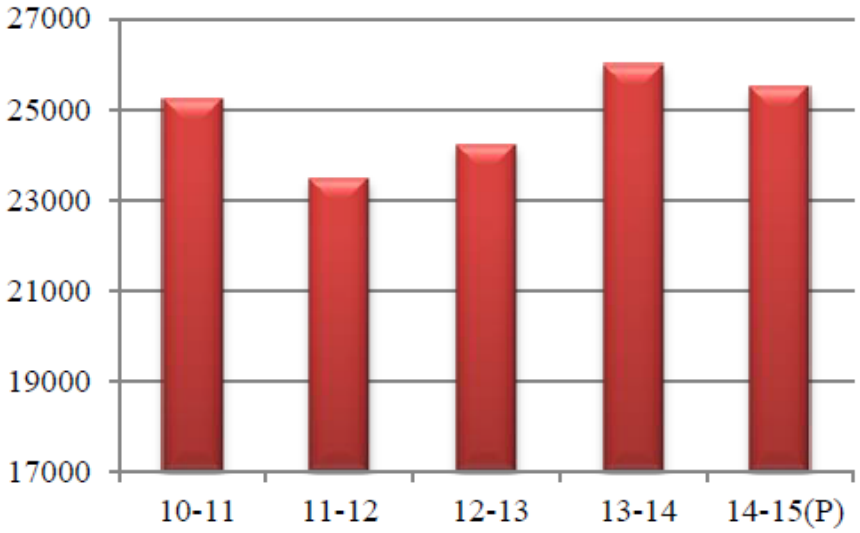
Source: statista 2014

The consumption of wheat cereal is also very high proving that it is a vital component of daily food requirement over billions of people every day (Statista, 2014). In Pakistan, wheat contributes more than 60 percent of the daily food. About 70 percent of the wheat produced in the country is used in making domestic bread and the rest is used in different bakery products (Rahman *et al.,* 2014). Cereals play an important role in the food requirements of Pakistan population. Forty seven percent of the per capita calories and forty six percent of the per capita protein requirements are met by the cereals (FAO, 2011). Apart from being essential part of the daily food, wheat crop also plays an important role in the economy. It contributes about 10 percent of the value added in agriculture sector of the

country and 2.2 percent in GDP. The area under wheat crop cultivation recorded 8,693,000 hectares in the year 2012-13 with grain yield of 24.2 million tons (GOP 2013).

Although Pakistan is one among the top ten wheat producing countries, but the average production is very low as compared to the other countries (Noorka *et al.,* 2009). Pakistan has an average wheat production 2787 kg of wheat per hectare which is substantially low as compared to the world wheat average yield 3210 kg/hectare (Mehmood *et al.,* 2014). Figure below shows the irregularity in wheat production in the country during the half decade. The reasons for the irregular yield include seasonal shocks, weather extremities, imperfect marketing system and specially lack of access to resources by farmers.

Figure 3.3: Wheat production (1000 Tons)

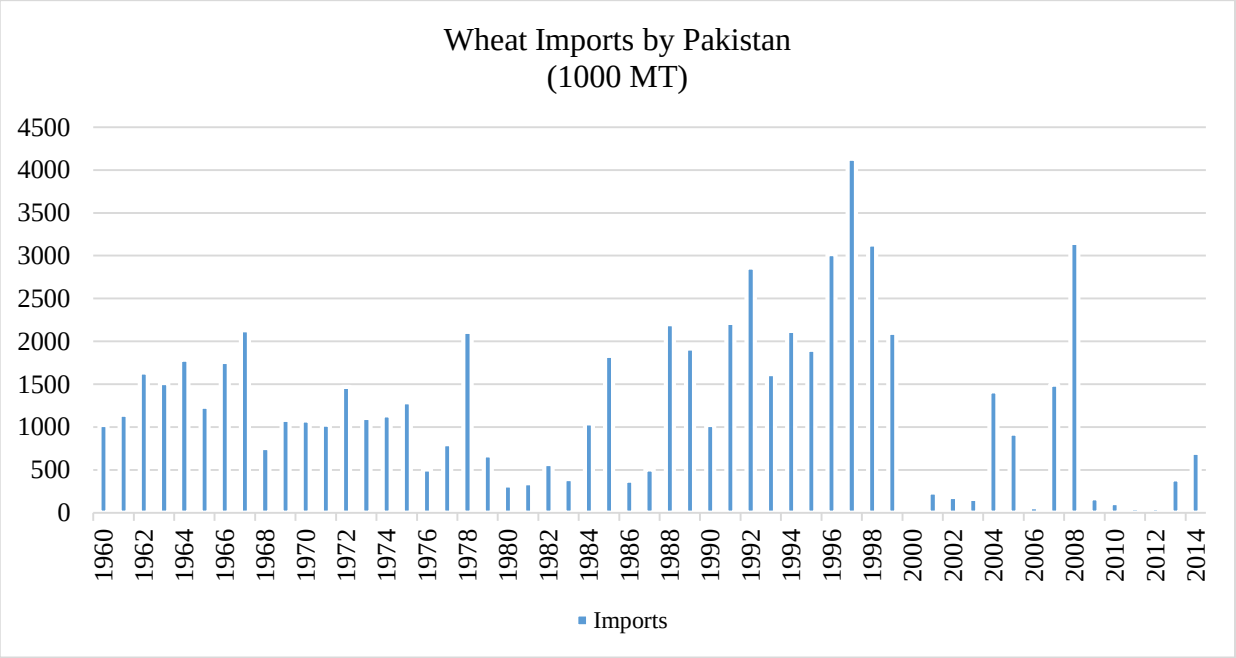


Source: GOP, 2014. Economic survey of Pakistan.

The situation is getting worse almost every year. The local supply of the commodity is unable to fulfill the demand of increasing population and consequently the wheat is now being imported. Figure 3.4 shows the statistics of the wheat imports for the last four decades. The figure shows that in the last forty years, there were only three years when wheat was not

imported. The population is increasing rapidly and Pakistan is expected to be the 5th most populous country in the world by the year 2050 (GOP, 2013). The arable land of the country and resources are not increasing. To feed the increasing population, Pakistan has to make wiser use of available resources. Other countries of the world specially the developing ones are not an exception. If the circumstances remain unchanged, the overall wheat production will tend to decline not only in Pakistan but also in Southern and South-Eastern Asia, Russia and Eastern Europe, and North America. This fall in the productivity will also affect wheat production in south and south-eastern Asian countries like Pakistan, India, Nepal and southern China by 20 and 30% in the 2050s and 2090s, respectively (Balkovič *et al.,* 2014).

Figure 3.4: Wheat Imports of Pakistan.

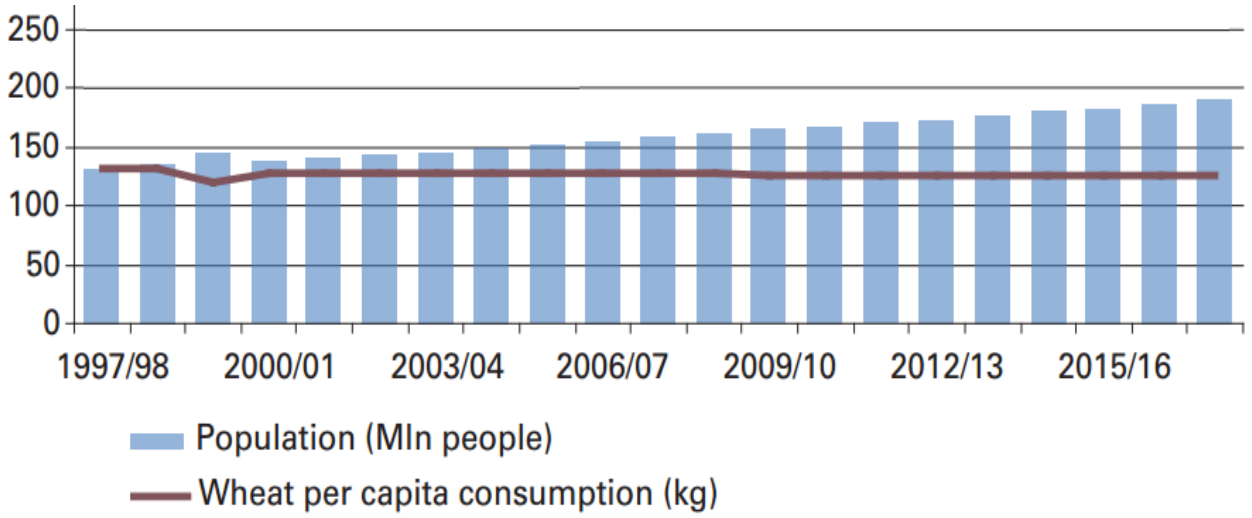


Source: United States Department of Agriculture.

A study by Nazli *et al.,* (2012) suggests that the increasing difference between a higher population growth rate (2.42 % per annum) and food grain production (1.4 % per annum) indicates the country's inability to feed the growing population and this could result in the

shortfall of wheat which is estimated to be up to 2.382,000 tons by the year 2017-18 as shown in the figure below. Per capita wheat consumption almost remain unchanged but the population is continuously increasing. If the population growth rate cannot be controlled then there is the need to produce more food from the existing resources.

Figure 3.5: Per capita wheat consumption in Pakistan.



Source: FAO, 2013.

The agriculture system of Pakistan is characterized by land asymmetry. A large number of farmers have small landholdings and produce staple food for their domestic needs and grow cash crops for their livelihood. About 81 % of the farms in Pakistan are small holdings which occupy 39% of the cultivated area. In Punjab, the statistics does not vary significantly; 79 % of the small farms occupy 40 % of the farm area (Government of Pakistan, 1990).

Majority of the farmers in Pakistan are poor and have no or very little access to resources. Farmers need inputs like seed, fertilizer and chemicals apart from cultural practices to grow crops and access to these resources needs money. Small and subsistent

farmers face a long list of problems is managing the significant being liquidity constraint. Agriculture is an enterprise that pays only at the sale of produce, most commonly twice a year. So, these poor farmers have no means of regular income. They cannot save this money and usually invest their earnings in the form of cattle, gold or other readily salable items and when they need money, the assets are liquidated. In case of acute need for the money usually these assets are sold at the less purchased price.

Given the importance of the wheat cereal in Pakistan and diminishing average yield, increasing imports, low productivity as compared to the other countries of the world, there is a need to investigate the issue to find out the reason for low productivity and to make policy guidelines to help farmers increase their production which will ultimately improve their welfare.

3.3.1.2 Cotton production in Pakistan

Agriculture sector in Pakistan is mainly characterized by poverty in many faces like lack of income, lack of employment, clothing, shelter, education, medical facilities, availability of clean drinking water and human rights (Bhutto and Bazmi, 2007). The agriculture is a main pillar of Pakistan's economy and cotton is the backbone of agriculture. It is cultivated on 15 percent of the total area of which 75 percent is in Punjab and 25 percent in Sind province. About 1.6 million farmers grow cotton and many of these farmers are small holders. Cotton crop provides raw material to the textile industry which employs about 10 million workers accounting about 40 percent of the industrial labor force. This industry occupies the first position as it earns about 8 percent of the total Gross Domestic product and half of the foreign exchange. The industry comprises of 1000 ginning factories and 300 oil refineries (Rehman, 2015).

According to FAO (1999), the cultivation of cotton started in Indus valley civilization for the first time in history which is now the area of Pakistan. Cotton is cultivated on over 15 percent of the total cultivated area by 1.3 million farmers, making Pakistan a big producer, consumer and exporter of cotton (GOP, 2006). Because of the high share of Pakistan cotton to the world (8 percent), it is regarded as white gold (Pakistan.com, 2007). After meeting domestic requirements, remaining cotton is exported in the form of raw cotton, cotton yarn, garments and cloth to the different countries of the world. Cotton industry provides livelihood to the millions of rural households. Rising cost of production, low per acre yield, insects and pests attack on the crop, weather immoderations, waterlogging and salinity are among the major threats facing the cotton industry. ICAC, 2006).

3.3.2 Limiting factors in agriculture

As stated earlier, Pakistan is a developing country and there is lack of good governance resulting in increased poverty and vulnerability. Agriculture sector is the most affected. Use of traditional methods of cultivation and low or inefficient mechanization is a big hurdle in achieving high yields. Unavailability of quality inputs like improved seeds and fertilizer also lead to low production. Inadequate infrastructure like ineffective input and output markets, storage houses and consolidated roads result in loss of quality and quantity of agricultural produce.

Majority of farmers in Pakistan are not well educated and this affects their ability to innovate and adopt technology resulting in low yield. As farmers have small land holdings, subsistent farming is very common. Farmers usually consume major part of their produce

and grow limited number of crops per year. There is a never-ending list of problems inefficient agriculture is facing but the most important is the liquidity constraint. Farmers are poor and agriculture market is instable. Commodity prices are prone to change rapidly. Rise in input prices and fall in output prices have a negative impact on farmers' welfare. Lack of credit facilities play havoc with the already miserable financial condition of the farmers. There is need for government interventions to remove these barriers and to provide a risk free agriculture where the prices remain stable and farmers have uniform access to resources.

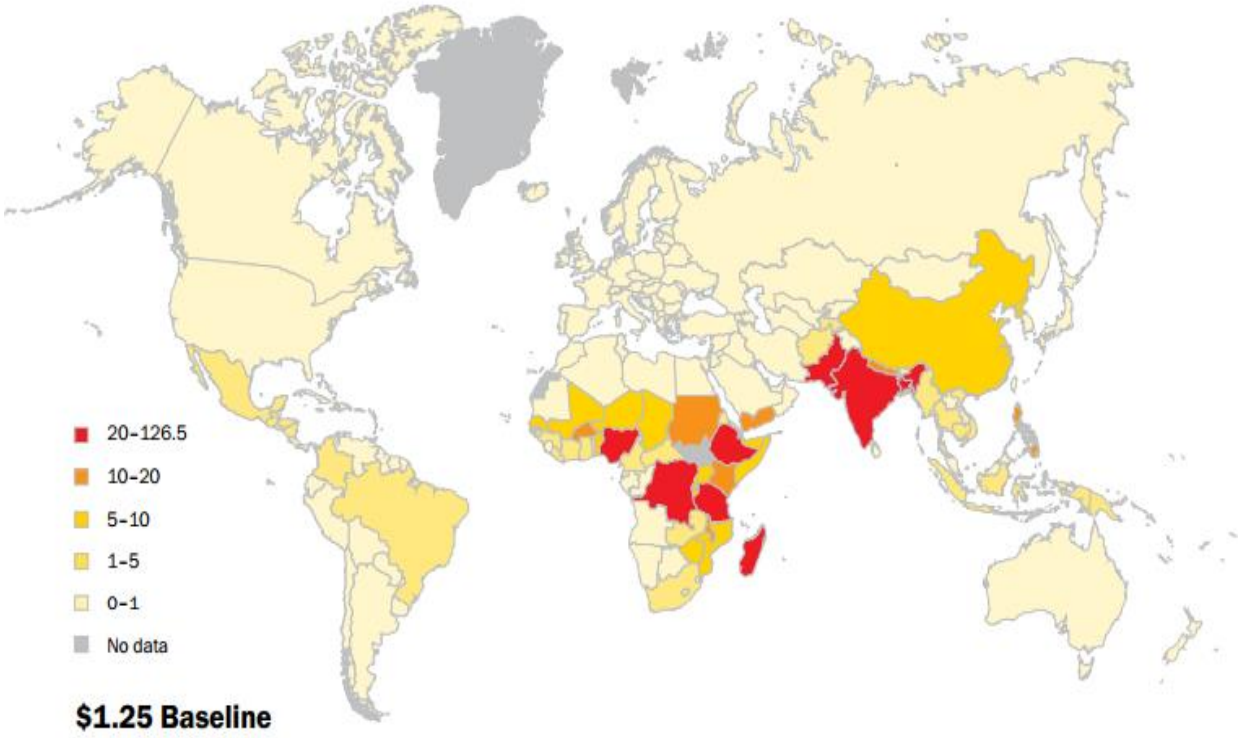
3.4 Poverty in Pakistan

Poverty exists in many forms in Pakistan. Among several causes of poverty, poor governance is a major cause of vulnerability and poverty. Political instability also plays an important role in increasing poverty level. There is lack of development plans and public investment. Governments mostly rely on tax incomes and the economic growth remains low causing unemployment and lack of economic opportunities. Increase in vulnerability has been observed in Pakistan, from 13.5% to 24.5% in 2010 making 19.10 million people poor and the level of extreme poverty is 21 percent. The ratio of employment to population is an indicator of economic growth. It defines the ability of economy to employ its population. The economy of Pakistan could only employ 43 percent of population which is the sign of weak economy (ADB, 2014).

Poverty is characterized by inability to have proper food, education, medical facilities, clean drinking water and education (World |Bank, 2001). According to United Nation (2013),

more than half of the population in Pakistan has no or limited access to basic needs. Most of these poor people live in the villages and agriculture is the main source of their livelihood. UN forecasted that by the year 2030, Pakistan will be among the countries with most the poor people.

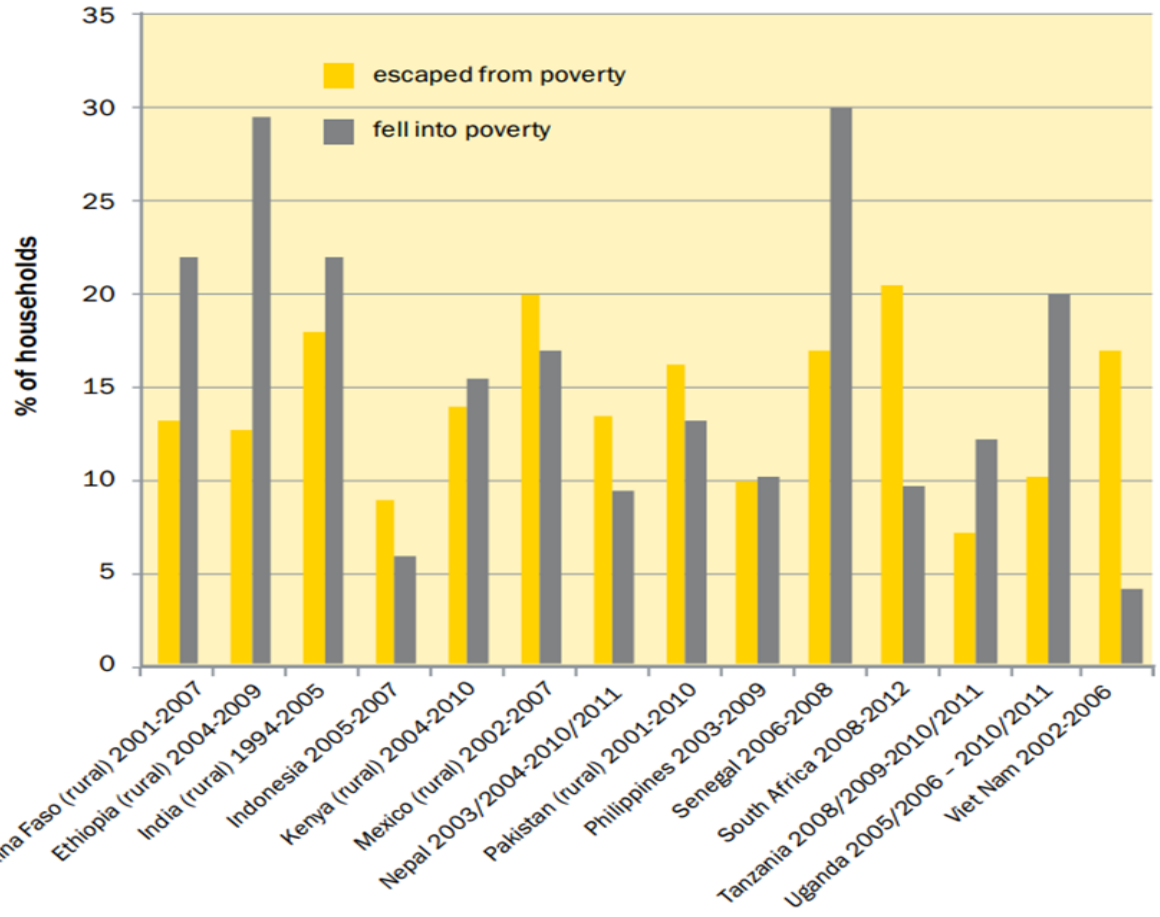
Figure 3.6: Map forecasting extreme poverty in the world in 2030.



Source: CPAN. The Chronic Poverty Report 2014-2015: The road to zero extreme poverty.

Government of Pakistan has reserved 205 billion rupees in the budget (2014-15) for agriculture sector development which will help reduce poverty and vulnerability (GOP, 2014). As poverty is a dynamic state, households keep on trying to escape from poverty trap and they sometimes succeed but because of some external shock they again fall in the poverty trap. In case of Pakistan, the situation seems improving as the figure 3.7 shows more people escaping from poverty than those falling back during the decade (2001-2010).

Figure 3.7: Poverty transitions: Escape and Descents into poverty.



Source: CPAN. The Chronic Poverty Report 2014-2015: The road to zero extreme poverty.

3.5 Lending to the poor and financial challenges

According to Aghion and Morduch (2005), small amount of loans to the poor and small borrowers can give high marginal returns. Following the theory of diminishing marginal returns to capital, the marginal returns from an additional unit of capital investment is higher for poor entrepreneur as compared to richer entrepreneur as shown in figure 2.4. Difference in marginal returns to capital is shown with the help of a concave production function. The

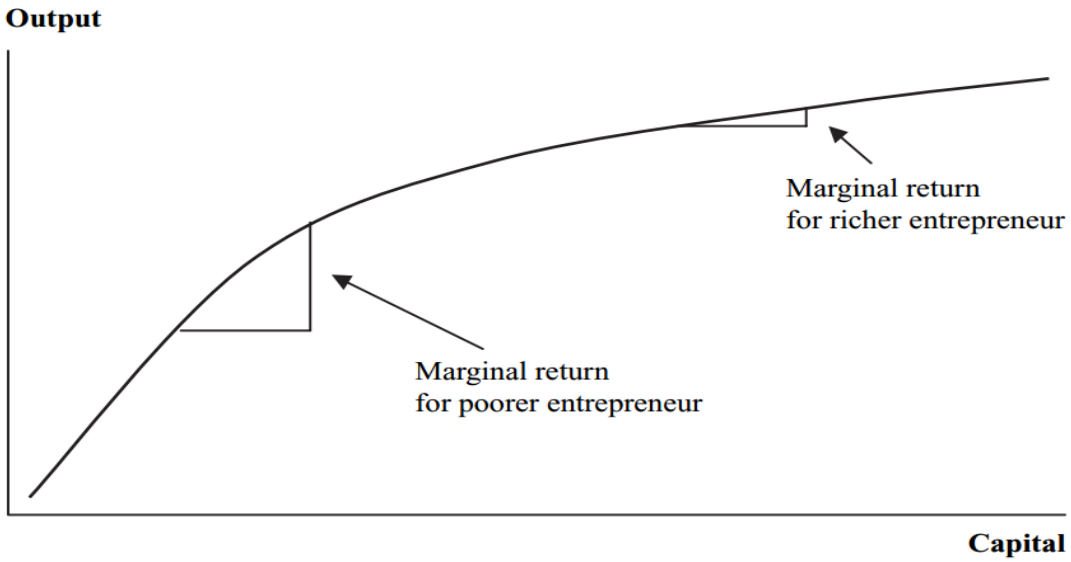
figure shows that poorer entrepreneur has a greater return on investing an additional unit of capital as compared to the richer entrepreneur.

This gives us an idea that small undercapitalized farmers may have a higher marginal returns from their borrowings but the real world conditions are pretty different. The poor farmers are usually not entertained by the formal commercial banking sector. There are several reasons like, commercial banks are often hesitant in providing financial services, such as loans, to clients with irregular cash incomes. Commercial banks incur substantial costs to manage a client account, regardless of the amount involved. For example, although the total gross revenue from delivering one hundred loans worth $1,000 each will not differ greatly from the revenue that results from delivering one loan of $100,000, but it will take a hundred times as much work and cost to manage a hundred loans as it does to manage one. The fixed cost of processing loans of any size is considerable as assessment of potential borrowers, their repayment prospects and security, administration of outstanding loans, collecting from delinquent borrowers, etc., has to be done in all cases. There is a break-even point in providing loans or deposits below which banks lose money on each transaction they make. Poor people usually fall below that breakeven point. In addition, most poor people have few assets that can be secured by a bank as collateral. As documented extensively, even if they happen to own land in the developing world, they may not have effective title to it, hence the land cannot be used as collateral for loans. (Soto, 1989).

Other reasons include the non-availability of loanable funds created by crowding out effect. According to Oliver (2008), crowding out is a phenomenon that occurs because of government involvement in the financial sector. Governments borrow funds available in the banks to meet their day to day use leaving behind less funds available to be borrowed by

entrepreneurs and general public. This way, the interest rate increases and the level of investment in the country falls down creating an adverse effect on tax earnings of the governments. Under this condition, when the government income is less than as compared to the expenditure, they repeatedly borrow from the banks and financial institutions resulting in increase in markup rates and leaving behind less funds available for the general public, businesses and farmers.

Figure 3.8: Marginal returns to capital (Comparison of Poor and richer entrepreneur)



Source: Aghion and Morduch (2005).

3.5.1 Credit market

A market for credit is different from the ordinary markets for goods and services. In ordinary markets there are homogenous goods and services which are sold and purchased by sellers and buyers on payments on the spot. Hence delivery and payments are made at the

same time whereas in case of credit markets, the situation is not the same. In credit markets, credit or goods are sold by the firms in exchange for the promise to pay in future. Such transactions involve a risk of breaking the promises to pay in the future. There is always uncertainty in meeting such promises which arise because of inability or lack of willingness of borrowers to repay at stipulated time leading to default of the borrower. This default can be due to loss in business or lacking personal intention to pay back loan.

So, on the basis of expected repayment of the loan, the customers are classified into good ones and bad ones, depending on their riskiness. The former with lower risk of default and later with higher risk. As a result of the higher probability of default, riskier customers are charged higher markup rates whereas customers with lower probability of default are supposed to be charged lower markup rates. In such a case, where there is uncertainty in repayment and customers are likely to default, the banks can only ask for the collateral as a guarantee of repayment in case of default (Friedman and Hahn, 1990).

Stiglitz and Weiss (1981), proposed that there is information asymmetry between borrowers and lenders. This asymmetry may lead to the problems like credit rationing, adverse selection and moral hazard. These problems are discussed in detail in the following sections.

3.5.2 Credit rationing model of Stiglitz and Weiss

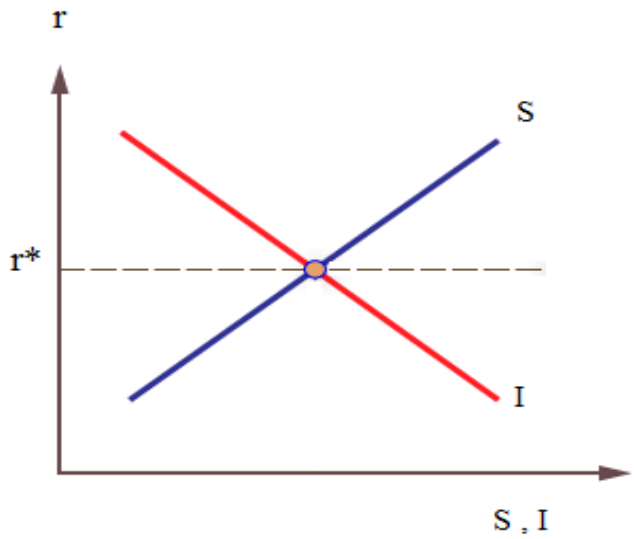
Credit rationing refers to the inability of financial institutions to lend the amount of loans to borrowers on their demand. Banks and financial institutions determine the amount of loanable funds. They limit the supply even if the borrowers agree to pay higher markup.

The credit constraint may also be due to the unresolved problems of adverse selection, moral hazard or costly state verification as a result of information asymmetries in the credit marketing, or due to the enforcement problems (Gathak and Guinnane, 1999; Ghosh *et al.,* 2001) and a positive credit history is also assumed to be among the most important devices to avoid credit rationing (Bester, 1987; Diamond, 1989).

3.5.2.1 Adverse selection

The credit is rationed because of adverse selection effect, as a result of asymmetric information between lenders and borrowers and the borrower's willingness to return liability and the riskiness of their projects. This results in screening, monitoring and enforcement problems. The poor clients in developing countries generally have no or less fixed assets to offer as collateral as a condition for loan. Risky investment environment and the above discussed factors give rise to high transaction costs (Binswanger and Rosenzweig, 1986; Hoff and Stiglitz, 1998). In an equilibrium market, the rate of markup remains r* which is regarded as equilibrium markup rate. Figure 2.9(a) shows an equilibrium state where level of investment equals the supply of funds from the credit market.

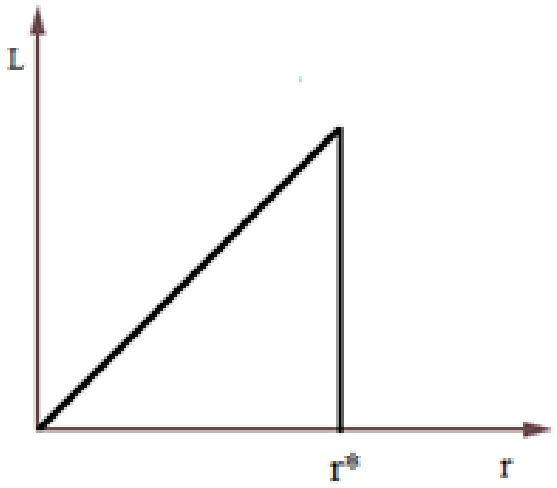
Figure 3.9(a): Equilibrium state.



Source: Stiglitz and Weiss (1981).

here S is the loanable funds and I is the level of investment. S denotes the supply and I denoted the demand for the loan amount. At any point below r*, the loan will be cheaper and above r*, the loan will be costly suggesting that the level of markup depends on the demand and supply forces. In this case, when markup rate is at equilibrium state meaning the credit is neither cheap nor costly, expected clients having projects with higher probability of success and less profit and the ones having projects with lower probability of success and higher profit will apply for the credit.

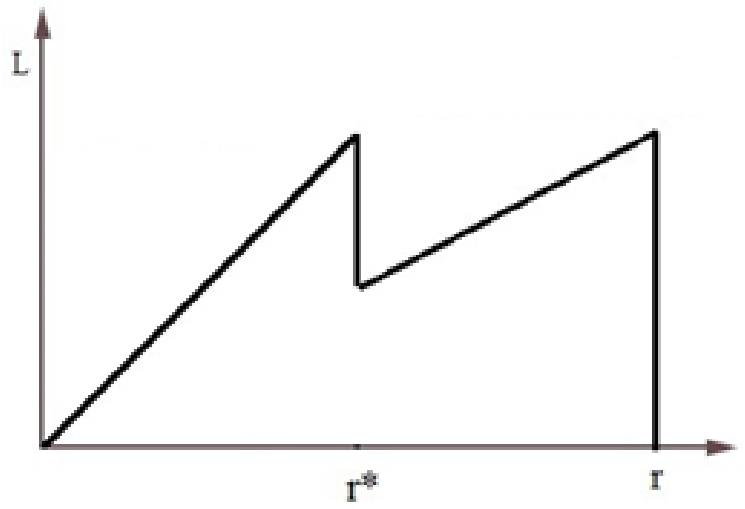
Figure 3.9(b): Markup rate at equilibrium.



Source: Stiglitz and Weiss (1981).

Bankers are aware that there are borrowers with projects of high and low probability of success but they cannot distinguish between them. Thus they use markup rate as an instrument. In case if the credit is costly, the borrowers with higher probability of success leave the banks because their projects are less risky and a slight increase in the markup rate has a considerable effect on their profits. So, they are credit rationed as a result of asymmetric information as shown in figure 3.9(c), at markup rate r which is higher than equilibrium markup r*, only the risky borrowers are willing to borrow.

Figure 3.9(c): Costly markup



Source: Stiglitz and Weiss (1981).

3.5.2.2 Moral hazard

Holmstrom and Jean (1998) found that asymmetric information does not result in adverse selection but moral hazard. In case of moral hazard, after the contract has been signed, one of the parties of the contract, usually the client exerts less efforts in the project as customer is sure of the success of the project. In this case, the borrower can influence the outcome of the project by exerting high or low efforts. Higher efforts may result in higher profits and low efforts the other way round. In order to make sure that customer exerts maximum efforts banks ask for the collateral and some initial investment from the customer's pocket regarded as agency cost. A customer lacking collateral and agency cost is credit constraint.

3.4.2.3 Red lining

The credit rationing can also be because of redlining. In this case, a typical group of potential borrowers, some professions, and certain projects are credit rationed on the basis of their risk profile. For example in Pakistan, commercial banks usually do not lend to the farmers having land less than 2.5 acres and in case of tractor, minimum 10 percent of the tractor cost is paid by the farmer in advance and must have a minimum land of 5 acres.

Apart from the above constraints, in developing countries, legal credit institutions offer credits for the poor and needy at a rate of interest which is below the market rates. Indeed, the interest rate is sometimes lower than that of inflation. This is why these subsidized credits cannot meet the demand. Since credits are granted mainly in accordance with the banking methods of obtaining security, only those farmers who can offer the required material security have access to them. Moreover, due to the shortage of credits in special programs, it is mainly those farmers who have personal contacts and influence in the credit institutions that participate. Thus, the scarce credits are redistributed in accordance with the prevailing societal modes of distribution (Manig, 1990).

Not only the formal loans but also informal loans matter in agriculture (Khandkar and Faruqee, 2003). The informal sector has compensated for the inadequacy and restrictiveness of the formal sector (Tang, 1995). The main reason behind is the better information of the lenders about borrowers from being insiders (Bardhan and Udry 1999). Informal sector lenders, such as merchants, landlords and shop keepers exploit small farmers by charging very high interest rates (Chaudhuri and Dastidar, 2011). Through such rates, informal lenders extract substantial monopoly profits, that they regularly take advantage of the

economically weak, and that they do not provide legitimate economic services (Adams, 1984).

Despite efforts to provide access to financial services, it has often been argued that both formal and informal sectors in the developing world have failed to serve the poorer section of the community (Chowdhury 2008). As the rural poor have very limited access to the organized and formal financial sector, they resort to private money lenders in order to finance their immediate needs. Unfortunately, credit market isolation coupled with an inelastic demand for credit, allows such private moneylenders to decide freely what interest rate to charge (Sundrum 1992; Gupta and Chaudhuri 1997), thus forcing their low-income borrowers to pay much higher interest for credit than would be necessary if commercial microfinance were widely available through financial institutions with broad outreach (Robinson, 2001). Studies by Dowla (1998) reveal that interest rates being charged by the informal sector are simply exorbitant and may vary by anywhere from 10 to 120 percent per annum for initial investment, and up to 240 percent for working capital financing. Robinson (2001) argues that, given the large share of credit market which moneylenders hold in many developing countries, the high interest that borrowers pay can have a substantial negative effect on development efforts, as it tends to impede the growth and progress of borrower's micro-enterprises.

Microfinance institutions focus on providing credit to the poor in order to reduce poverty and to break vicious circle of fighting against their miserable circumstances as they have no access to the commercial banks (Hermes *et al.,* 2011). The limitations and insufficiencies in the formal as well as informal financial sectors, as stated above, have led not only to the evolution of microfinance (Chowdhury 2008; 2009), but also towards its

immense popularity all over the developing world as a key tool in development related programs (Germidis *et al.,* 1991; Aghion and Morduch 2000; Cheston and Kuhn 2002; Gallardo 2003; Brau and Woller 2004; Dunford 2006; Chowdhury 2009). The underlying premise of microcredit is to provide credit without the borrower having to surrender his assets as security in case of non-payment. Yunus (1997) criticises collateral provisions for depriving poor people of credit facilities within the formal financial sector institutions, stating that it constitutes a form of 'financial apartheid'. Moreover, group based microfinance programs, as introduced by Grameen Bank have an informational advantage of asymmetric information over outside lenders. Group members can monitor the activities of each other (Pitt and Khandker, 1998).

3.6 History of microfinance

The concept of microfinance was pioneered in 1970 by two modest entrepreneurs David Bassau (Co-founder of Opportunity International) and Muhammad Yunus (Grameen Bank). They both loaned their own money to poor people in Bali and Bangladesh. That small loan helped poor people to start small businesses, and with the income they were able to provide themselves and their families with food, shelter and other basic necessities (OIAL 2009:1). Today's microfinance started in 1976 when Mr. Yunus visited a village in southern Bangladesh where he met a weaver forced to sell bamboo stools at minimal profit to her materials supplier. Mr. Yunus lent a total of $27 to 42 village women, all of whom repaid their loans and (successfully) launched businesses. The Grameen Bank was thus funded. In 2002, Grameen lent $380 million in 3.82 million loans with a repayment rate of 95%, in 35,000 villages and with a staff of 14,000 people. Grameen model has been replicated worldwide and

has inspired over 7,000 microfinance institutions in Latin America, Africa, and Asia serving 25 million poor clients (Chemin, 2008).

The distinguishing features of microfinance from commercial financial include the small size of loan, no need of collateral, and simplicity of operations (Central Bank of Nigeria, 2005). For their quality service and helping poor getting rid of poverty, Mohammad Yunus, the founder and Grameen Bank jointly received the Nobel Peace prize in 2006.

Microfinance is a poverty combating tool and focuses on low income households who are usually not entertained by the commercial banking sector (Weiss and Montgomery, 2004). Microfinance plays an important role in changing the shape of lives of many poor around the globe. There are many studies which found a positive relation between microfinance and overall economic growth (Pagano 1993, Ross 1998 and Lucas 1998). Microfinance's Grameen model being used in different parts of the world including Asia and Africa (Thapa, 2007). The number of beneficiaries is increasing. This sector is absorbing 35 percent borrowers annually (Navaja and Tejerina, 2006). In Pakistan, microfinance sector is growing in both public and private sectors. Pakistan has a well-developed microfinance infrastructure consisting of public sector banks and non-government organizations.

3.6.1 Microfinance: definition and significance

Microfinance is the provision of all types of financial intermediation services (like savings, credit, funds transfer, insurance, pension and remittances etc.) to low income households and enterprises in both urban and rural areas, including employees in the public and private sectors and self-employed (Robinson, 2003). More broadly, it is

a movement whose object is "a world in which as many poor and near-poor households as possible have permanent access to an appropriate range of high quality financial services, including not just credit but also savings, insurance, and fund transfers" (Christen *et al.,* 2004).

The economists, who promote microfinance believe that the access to credit will help the poor overcome poverty. Microfinance provides a wide range of financial services including microcredit. Microcredit is in-fact the core issue but it is one of the aspects of microfinance. Due to the broad range of microfinance services, it is difficult to assess impact, and very few studies have tried to assess its full impact (Feigenberg *et al.,* 2011).

The experience of many microfinance institutions so far strongly suggests that it is possible for the institutions to reach the goal of serving people in extreme poverty without having to sacrifice their profitability. This is mostly because microfinance is designed with the poor in mind, while at the same time being founded on market principles of competitiveness, pricing and sustainability. There is nothing wrong in earning money while serving the poor, as long as earning money does not become the prime or the only goal of microfinance providers (Latifee, 2007).

Three features distinguish microfinance from other formal financial products. These are: (i) the smallness of operation. Small loans and or small savings are also collected in contrast to commercial banks, (ii) the absence of asset-based collateral, and (iii) simplicity of operations (Central Bank of Nigeria, 2005). The attention for microfinance and its role in reducing poverty was increased when the UN declared 2005 to be the international Year of Microcredit, and when Mohammad Yunus, the founder of the Grameen Bank, received the Nobel Peace prize in 2006. According to the Nobel Committee, microfinance can help people

to break out of poverty (Nobel Committee, 2006). This idea led to an almost euphoric attitude among policy makers and aid organizations about potential poverty reducing effects of microfinance.

Many authors argue that microcredit can help to substantially reduce poverty (Littlefield, Morduch and Hashemi, 2003; Dunford 2006). Access to credit can contribute to a long-lasting increase in income by means of a rise in investments in income generating activities and to a possible diversification of sources of income; it can contribute to an accumulation of assets; it can reduce the vulnerability due to illness, drought and crop failures, and it can contribute to a better education, health and housing of the borrowers.

Access to microfinance has positive impact on expenditures and school enrollment (Chemin, 2008; Pitt and Khandker, 1998). Providing poor people with effective financial services helps them deal with vulnerability and can thereby help reduce poverty. However, the relationship is driven by complex livelihood imperatives and is not simple. Microfinance is not a panacea that converts the poor into the non-poor. Rather, it can be a platform that raises the likelihood of success of the strategies to escape poverty that poor households pursue (Martin *et al.,* 2002).

During the past fifteen years, by the recognition of an increasing number of successful institutional innovations, microfinance institutions provide savings, credit and insurance services to poor people in developing countries which were previously thought of being un-bankable and uninsurable (Zeller and Sharma, 2000). According to Rutherford (2000), access to savings and credit facilities is very important as it enable the poor to create, own and accumulate assets and smooth consumption expenditure.

Microfinance is unique among other development interventions. It delivers benefits to the poor on a large and permanent basis. In lieu of this, microfinance allows the poor to protect, diversify and increase their sources of income which is an essential path out of poverty and hunger (Mordutch at al., 2003). In Ghana, participants experienced an increase in monthly nonfarm income of $36, compared to $17 for the comparison group. Participants were more likely to breastfeed their children and more likely to delay the introduction of other foods to their infant's diets until the ideal age and they were more likely to properly rehydrate children who had diarrhea by giving them oral rehydration solution. These impacts paid off in a significant increase in height-for-age and weight-for-age for children of participants (Pitt *et al.,* 2003).

3.6.2 Salient features of microfinance

Microfinance as stated earlier is the provision of small loans to the poor sector of the economy, which is usually not entertained by the formal sector. According to the Murray and Boros (2002) microfinance has several features which are discussed as follows:

Microfinance facilitates its customers with small amounts of loans which are in accordance to their capacity and are easily returned. These loans are short term loans and the duration is mostly one year. Microfinance offers the savings option to its clients who were previously compelled to invest their savings in non-economical transactions like purchase of cattle or buying gold. Farmers can also use their saved money to repay their loans. Although the markup rates are higher as compared to commercial banks but lower than informal money lenders.

In case of informal money lenders, the credit facilities have low transaction cost, there is no need of legal necessities, administration cost is negligible and credit facilities are readily available but at a high markup cost. Apart from higher cost which may even have negative impact on welfare, activities of informal are not legitimate and hence do not provide any security to the borrowers against different types of shocks, like crop failure due to weather conditions, insects, pests attack on the crops or other natural disasters. Microfinance provides cover against such type of shocks. In many programs, in case of death or permanent disability of borrower the loans are written off.

Microfinance institutions help their customers' easy entrance to the microfinance programs which saves time and transaction cost. Under different programs, the employees of microfinance institutions visit their target areas and help poor households in getting credit facilities. Application procedures are simple with short processing time. The clients get reward on timely repayment. The most important feature of microfinance is the exemption of collateral.

3.6.3 Microfinance in Pakistan

In 2000, the Pakistan poverty alleviation fund (PPAF) was started with the aim to alleviate poverty by providing funds through NGOs and community based organizations. Initially, PPAF had signed agreements with five partner organizations to disburse 5 billion rupees over the next five years. These partner organizations included Agha Khan Rural Support Program, Family Planning Association of Pakistan, National Rural Support Project, Taraqee Trust and Kashf Foundation. (Shirazi and Khan, 2009).

There are seven microfinance banks in Pakistan, which are engaged in provision of production and development loans to farming community for agricultural activities. Government of Pakistan is supporting microfinance sector to boost agriculture. GOP reserved 380 billion rupees for this purpose, which is 31.5 percent higher than for the year 2013-14. Out of the total target, 252.5 billion rupees have been allocated to five major banks, 90.0 billion to ZTBL, 115.5 billion to 15 Domestic Private Banks, 11.5 billion to Punjab Provincial Cooperative Bank, 28.2 billion to 7 Microfinance Banks and 2.3 billion to 4 Islamic banks for 2014-15. Moreover, GOP provided seven Microfinance banks 20.7 billion which accounts for 73.6 percent against their annual target of 28.2 billion (GOP, 2015).

Among microfinance institutions, ZTBL (Zarai Taraqiati Bank Limited) formerly known as ADPB (Agricultural Development Bank of Pakistan) is the largest microfinance service provider in Pakistan. It provides credit facilities to over half a million borrowers annually. Among other institutions and organizations, NRSP (National Rural Support Program), PRSP (Pakistan Rural Support Program) and many others like these are active in different parts of Pakistan helping people out of their poverty.

Chapter 4

Conceptual frameworks and empirical models

This chapter presents conceptual frameworks and empirical models used in this study. Section 4.1 describes the conceptual framework and empirical model employed for impact of microfinance on welfare indicators including per head expenditure, poverty gap and severity of poverty. The same section also showcases the conceptual framework and theoretical model for the impact of microfinance on input use, yield and net returns of cotton growers as we have used Endogenous switching regression model for the estimation of both objectives. Section 4.2 represents conceptual framework and empirical model used to estimate the impact of microfinance on technical efficiency of wheat farmers in rural Punjab.

4.1 Conceptual framework for impact of microfinance on household welfare, input use, yield and net returns

A random utility model (Feder *et al.,* 1985) is employed in this study. According to this model, the decision of household to participate in microfinance program is demonstrated as discrete comparison of expected utility of household welfare indicators: per-head expenditure, poverty gap and severity of poverty from the alternative regime (non-participation). Input use in cotton crop, yield and net returns are also estimated following the same model. We followed the model used by Kleemann *et al.,* (2014) in this study.

Microfinance program is assumed to be a binary choice in which the household weighs up the expected net utility from participation in MF program against the non-participation.

The participation in MF program can be viewed as a standard binary choice problem that is based on the maximization of an underlying utility function. If we let D_{1i}^{*} represents the expected utility derived from participation in MF program and D_{0i}^{*} is the expected utility derived from nonparticipation of household i(i = 1, . . ., N) of an observed population of size N, then the difference between the expected utilities of the participation and that of nonparticipation is $D_i^{*} = D_{1i}^{*} - D_{0i}^{*}$. We cannot observe the utility but what we can observe is the participationD_i , where $D_i \in \{0, 1\}$. D_i is a dummy variable where $D_i = 1$ when household decides to participate in MF program and $D_i = 0$, otherwise.

$$D_i^{*} = Z_i^{'}\alpha + \in_{Di} \qquad 4.1$$

$$D_i = 1 \; if \; D_i^{*} > 0$$

$$D_i = 0 \; if \; D_i^{*} \leq 0$$

Where D_i^{*} depends on a vector of observed variables Z and error term $\in_D$ with zero mean and equal variance σ_D^2

The probability of adoption can then be expressed by:

$$\Pr(D_i = 1 \mid Z_i) = \Pr(D_{1i}^{*} > D_{0i}^{*}) \qquad 4.2$$

$$= \Pr(D_i^{*} > 0)$$
$$= F(Z_i^{'}\alpha)$$

where F is the cumulative distribution function of $\in_D$

We are not only interested in the participation decision, but also the impact of participation on the return on our outcomes of interest. The relationship between participation and outcome variable *Y* can be expressed as:

$$Y_i = f(X_i; D_i) \quad 4.3$$

Where *X* is a vector of exogenous variables and *D* is the dummy for participation. If Y_{Di} is the outcome variable of individual *i* as a function of the adoption status *D*, *Y* can take two forms, Y_{1i} and Y_{0i}. An issue of significance in impact assessment is that of selection bias. Thus, when treatment is nonrandom, untreated individuals may differ systematically because of self-selection into treatment and at best the average treatment effect on the treated (ATT) can be estimated as follows:

$$\tau_{ATT} = E[Y_1|D = 1] - E[Y_0|D = 1] \quad 4.4$$

Where τ denotes the treatment effect, in this case the ATT and E[.] represents an expected value operator. Given that randomization is not possible in our case, we employ quasi-experimental techniques to correct for selection bias in estimating treatment effects. Selection bias caused by observables such as farm size can normally be controlled for with regression techniques.

4.1.1 Impact evaluation problem

Participation in microfinance programs can help in increasing the welfare of farm households. The impact of microfinance program can be evaluated by the difference in the outcomes of both participants and non-participants. But in this case, participants and non-participants will not be systematically same. The difference in their observed and unobserved characters may create a bias in the causal impact estimation. The difference in the outcomes will give the robust results if both are true counterfactuals: all the characteristics need to be same except the program participation, which is practically not

possible in case of quasi experiments. Hence, it is difficult to simply attribute the differences in welfare between participants and nonparticipants of microfinance. In such cases where experimental data are gathered through randomization, we do not have the information on the counterfactual situation (Gertler *et al.,* 2011).

The decision of households to participate or not to participate in microfinance program may be associated with the net benefits of participation. Households may self-select themselves into microfinance programs on the basis of net benefits giving rise to selection bias. In quasi experimental studies, the issue of self-selection is crucial. The issue of selection bias arises if unobservable factors influence both the error term of the microfinance participation equation and the error term of the outcome equation resulting in a correlation of two error terms. When the correlation between the two error terms is greater than zero, OLS regression techniques tend to yield biased estimates.

We can address the problem of missing counterfactuals by investigating the direct effect of technology adoption in our case, it is the participation in microfinance, by looking at the differences in outcomes among farm households (Blundell and Costa Dias, 2000). But the main challenge is to select the true counterfactuals in order to make a valid comparison group that has the same characteristics as the treatment group. These both groups must have on average the same characteristics in the absence of microfinance program and should respond to the program in the similar pattern if participated. When this criteria is met, we have the true counterfactuals (Gertler *et al.,* 2011).

4.1.2 Solution to impact evaluation problem

There are different econometric techniques which can be used to solve the problem of impact evaluation. Some of the techniques are described as under:

4.1.2.1 Experimental approach

In this case, data is collected through randomization, which is the most trusted technique (Burtless, 1995). In this approach, control and treatment groups are created. Control group has all the similar characteristics but only lacks treatment. This way, we have true counterfactuals and the difference in the outcome of treated and control group can give us the true impact of treatment.

In laboratory experiments this technique is workable but in case of social sciences, where we are to study the causal inferences on the large population, this method can be implemented but will require a lot of time and resources to establish. Like if we are to estimate the impact of microfinance on the rural households, first we will have to make a pool of respondents who have the similar traits, level of intelligence, education, family size and land holdings. We need their personal, locational, household and farm level pretreatment information and in the next step we will have to finance them with the same amount. After certain period of time we will again have to collect the same information regarded as posttreatment information. This process may utilize enormous time and resources and is not practicable.

4.1.2.2 Difference in differences method

This method estimates the changes in outcomes of both, the control and treated group overtime. This approach is also called natural experiment approach (Blundell and MacCurdy,

1999). This approach works by comparing before and after estimates of outcome for participants with the same before and after estimates of non-participants. This estimator can cope with macroeconomic changes so long as the changes affect the both, participants and nonparticipants. This highlights the need to find a suitable comparison of non-participants.

4.1.2.3 Instrumental variable approach

This approach is possible when a variable can be identified that it is related to participation and not to the outcome. Such variable is called instrument. The instrument introduces an element of randomness into the assignment which approximates the effect of an experiment. The drawback of the approach is that it is difficult to identify a suitable instrument (Hechman, 1995).

4.1.2.4 Heckman selection estimator

This estimator has widely been used in impact evaluation studies. It accounts for selection bias because of unobservable factors. It works by supposing that a specific form for the distribution of unobservable factors that jointly influence participation and outcome decisions. Adding this variable alongside the observed variables in the outcome equation solves the problem of self-selection and unbiased results can be obtained.

Then main drawbacks of this approach include: with the instrumental variable approach, the identification of a suitable instrument is often a significant practical obstacle to successful implementation and the resulting estimates are entirely contingent on the underlying distributional assumption relating to the unobserved variables.

4.1.2.5 Propensity score matching model

Propensity score matching estimator has achieved popularity as a tool of impact evaluation. PSM assumes that selection can be explained in terms of observable characteristics (Dehejia and Wahba, 2002) so, the hidden bias may still remain unsolved. It is defined as the conditional probability of participation given pre participation characteristics (Rosenbaum and Rubin, 1983). Matching deals with the selection process by constructing a comparison group of individuals with observable characteristics similar to those treated. The main purpose of the matching is to re-establish the conditions of an experiment when no such data are available. PSM is nonparametric approach and easy to construct but it has strong assumptions of unconfoundedness and common support.

In order to account for the impact evaluation problem, in this study we employed Endogenous Switching Regression Estimator (ESR). ESR is better estimator than PSM in the way that PSM only accounts for sample selection bias because of observables whereas ESR accounts for the sample selection bias because of observable and unobservable factors. Moreover, ESR is also better than Heckman selection estimator as Heckman estimator uses Limited Information Maximum Likelihood (LIML) as compared to ESR, which uses Full Information Maximum Likelihood (FIML) which is better estimator as compared to LIML and unveils better statistical properties.

4.1.2.6 Endogenous switching regression model

We employed the endogenous switching regression model (ESR) to account for selection bias from both observable and unobservable factors. The ESR (Lee, 1978 and Maddala, 1983) is a parametric approach that uses two different estimation equations for

organic and conventional farmers while controlling for the selection process by adding the inverse Mills ratio that is calculated via a selection equation in a first step, i.e., sample selectivity is treated as a missing value problem. The outcome equations are disposed differently for each regime conditional on the adoption decision, which is estimated by a probit model. Previous impact evaluations have used an endogenous switching regression model to estimate the effect of different technology adoptions in agriculture (e.g., Abdulai & Binder, 2006; Fuglie & Bosch, 1995).

Given the participation and outcome equations (4.1) and (4.3), respectively, the two regimes for participation and non-participation can be specified as:

$$Y_{0i} = X_i'\beta_0 + \in_{0i} \;\; if \; D_i = 0 \qquad 4.5$$

$$Y_{1i} = X_i'\beta_1 + \in_{1i} \;\; if \; D_i = 1 \qquad 4.6$$

where Y_0, Y_1 define the outcomes of interest separately for the two regimes of non-participation and that of participation in MF, and $\in_{0i}$ and $\in_{1i}$ are the error terms. Self-selection based on observables is thereby taken into account but unobservable factors could create a correlation between $\in_D$ and $\in_0$; $\in_1$. To solve this problem, the Mills ratios λ_0 and λ_1 are derived and the equations are transformed into the following specification:

$$Y_{0i} = X_i'\beta_0 + \sigma_{0D}\lambda_{0i} + u_{0i} \; if \; D_i = 0 \qquad 4.7$$

$$Y_{1i} = X_i'\beta_1 + \sigma_{1D}\lambda_{1i} + u_{1i} \; if \; D_i = 1 \qquad 4.8$$

Where $\sigma_{0D} = cov(\in_0, \in_D)$ and $\sigma_{1D} = cov(\in_1, \in_D)$. In these equations the error terms $u_{0i}$and u_{1i} have conditional zero means. Following Lokshin and Sajaia (2004) we use the full

information maximum likelihood method (FIML) to estimate this model. In this framework, the selection (probit) equation and the outcome equations are estimated simultaneously.

Some previous studies have employed two-stage method to estimate causal effects of program participation. This method includes the estimation of inverse mills ratios λ_1 and λ_0 from the selection equation in the first stage and subsequently incorporating these ratios in the second stage estimation. This method may generate heteroskedastic residuals that cannot be used to estimate consistent standard errors without adjustments (Maddala, 1986). FIML method fits the selection and outcome equations simultaneously and yields consistent standard errors. In STATA, full information maximum likelihood method is employed by using the movestay command. This method simultaneously estimates probit for selection equation and the outcome equations to yield consistent standard errors.

When the correlation coefficients of $\in_0$, and $\in_D$ of $\in_1$ and $\in_D$ are significant, the model has an endogenous switch. The signs of these correlation coefficients ρ_{0D} and ρ_{1D} can also be interpreted economically. Alternate signs signal that the individuals have adopted the technology according to their comparative advantages. Same sign implies hierarchical sorting, i.e., adopters have an above-average return compared to the non-adopters independent of the adoption decision.

Finally the ATT can be calculated as:

$$\tau_{ATT}^{ESR} = E[Y_1|D=1] - E[Y_0|D=1]$$

$$= X'(\beta_1 - \beta_0) + (\sigma_{1D} + \sigma_{0D})\lambda_1 \qquad 4.9$$

4.2 Introduction and Conceptual Framework for estimating technical efficiency

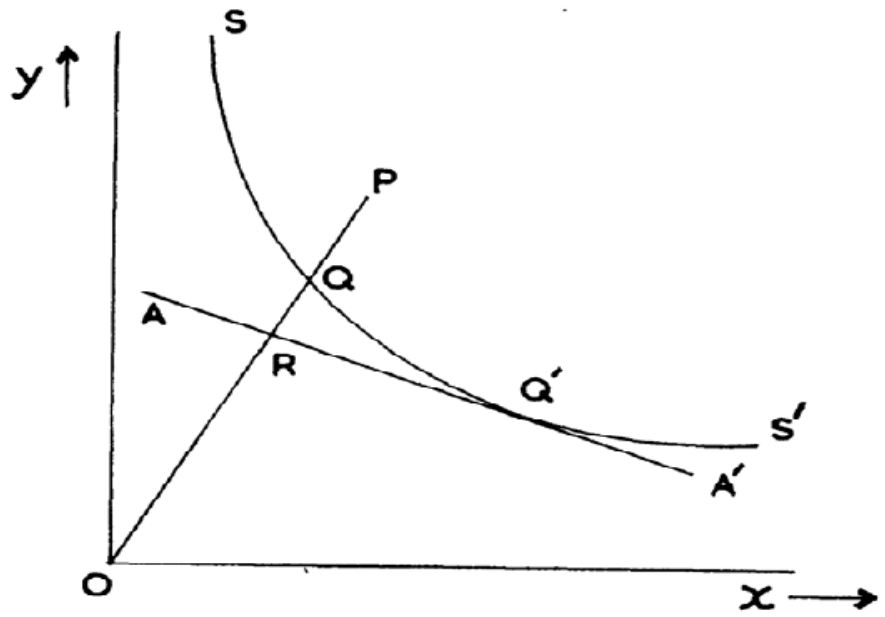
Measurement of efficiency of the production systems of farmers in the developing countries is a matter of interest for the researchers. Schultz, (1964) suggested that the farmers are poor but efficient in the developing countries. However, there are some inefficiencies in the allocation of resources in agricultural system. This hypothesis proved invalid but resource use efficiency became a hot topic for future research. Bravo-Ureta and Reiger, (1991) proposed that efficiency measurement may help in saving scarce resources. Measurement of efficiency in agricultural production can help governments and policy makers in proper allocation of resources and they can enhance the national output.

Researchers and policy makers generally recognized that examining the extent of inefficiency and identifying the sources of inefficiency is an important step forward to policy and decision making. Efficiency facilitates economic planning of an industry by giving an indication of how much output can be increased without further absorbing additional resources (Farrell, 1957). Evidence from China also shows that a large part of the productivity increase in agriculture between 1965 and 1985 is attributable to efficiency improvement, resulting from institutional changes (Fan, 1991).

The efficiency as stated by Kumbhaker and Lovell, (2000) is estimated by a comparison of actual output against the maximum attainable output using the same mix of inputs. Hence technical efficiency is defined as the ability to produce maximum output by utilizing minimum set of inputs. It is an input saving and output maximizing orientation. The

work of Farrel, (1957) spurred many studies on technology and efficiency measurement. Farrel gave an idea of production frontier to estimate the efficiency. The figure below illustrates Farrel's approach of efficiency measurement.

Figure 4.1: Farrel's measure of technical efficiency



Source: Ajibefun (2008)

According to Farrel, a product *P* is produced by employing two inputs, *X* and *Y* under the assumption of constant returns to scale. *SS´* represents an isoquant showing the production function by different combinations of *X* and *Y*. P shows the output as a result of the said inputs (*X* and *Y*). Q shows an efficient firm/ household using *X* and *Y* in the same ratio. *P* and *Q* are at the same isoquant, meaning that both are producing the same output. So, *OP/OQ* is the technical efficiency of a farm household. If this ratio equals 1, the household is technically efficient and in case the ration is less than 1, the household is inefficient.

The conceptual model of this study is in line with the stochastic frontier. Over three decades, the stochastic frontier (SF) model has been widely used to examine efficiency and the determinants of inefficiency among firms. The model specifies the unobserved error of the production, cost, revenue, profit or distance functions to accommodate for both random shock and inefficiency.

The production activity involves utilizing a particular set of inputs, technology and transforming them into an output. The ratio of output and input is called technical efficiency. In case when the output is an agricultural commodity, the technical efficiency is the ability of a farmer to produce maximum output with a given set of inputs and technology (Goldman, 2013). The efficiency analysis gives information about the level of effectiveness with which inputs are transformed into outputs. A farmer who is utilizing an appropriate set of inputs and technology but not producing maximum possible output is not optimizing the use of resources leading to decreased output and increased cost (Abdulai and Tietje, 2007).

In this study the relationship between microfinance and technical efficiency in the wheat crop production of the microfinance borrowers is the core issue. For this purpose, stochastic frontier production function is employed.

We assume that households tend to maximize their output by using a set of inputs. The output is the function of different inputs used by the households:

$$Y_i = \alpha + x_i'\beta + v_i - u_i \qquad (4.10)$$

Given $v_i - u_i = \varepsilon_i$

here Y_i denotes logarithm of output, x_i' is a vector of inputs used by the farmers, α and β are the parameters to be estimated. In this case the composite error term of the stochastic

frontier model, ε_i is composed of two components: noise v_i, called as statistical or white noise and inefficiency u_i. Noise accounts for the random effects whereas systematic effects which have not been explained in the production function but they contribute towards technical inefficiency are included in u_i, the inefficiency term.

In order to estimate the technical efficiency, there are two approaches: one step and two step approach. In two step approach, one sided error term, the inefficiency is estimated with exogenous influence. In the second stage, estimates are regressed against explanatory variables. In this case, if the variables in the production function and variables included in the inefficiency component are correlated, the estimates are biased (Kumbhakar and Lovell, 2003).

The one step method estimates the relationship between production process and factors explaining inefficiency simultaneously. Reifschneider and Stevenson (1991) and Kumbhakar *et al.,* (1991) propose simultaneous estimation of the deterministic term and the inefficiency structure using maximum likelihood methods. In this study, one step approach suggested by Battese and Coelli (1995) was used. The main intuition behind using one step approach is the contradiction of identical distribution assumption of the ui representing technical inefficiency. In two step approach, ui is assumed to be identically distributed in the first step and in the second step, it is specified as a function of explanatory variables (Abdulai and Eberlin, 2001).

Following

$$C_i = x_i'\beta + (v_i + u_i) \qquad \text{for} \quad i = 1, \ldots, n \tag{4.11}$$

The production frontier model can be specified as:

$$Yi = Exp(\beta Xi)\exp(vi - ui) \quad (4.12)$$

Here Yi denotes the quantity of output for household *i.* Xi is row vector where the first element represents the intercept and the remaining elements represent quantities of inputs employed to produce Y. β is column vector of technology parameters to be estimated. vi is random error term assumed to be independently and identically distributed (N (0, σ^2_v)). ui is a non-negative error term ($ui \geq 0, Vi$) representing technical inefficiency of Household *i.*

The stochastic production frontier consists of three components:

First one, $Yi = F(Xi\ ;\ \beta)$, being the deterministic production frontier. Second is the noise: $\exp(vi)$ and inefficiency $\exp(-ui)$, the third one.

The value of inefficiency term is 0 ≥ 1. As discussed above, the technical efficiency is the ratio of observed output to stochastic output.

$$TE_i = \frac{Y_i}{Exp(X_i\beta + V_i)} \quad (4.13)$$

Putting the value of Y_i from equation (4.12)

$$TE_i = \frac{Exp(\beta Xi)\exp(vi - ui)}{Exp(X_i\beta + V_i)} \quad (4.14)$$

$$TE_i = \text{Exp}(-u_i) \quad (4.15)$$

To estimate the stochastic production models, we employ a translog functional form. Kumbhakar and Lovell (2000) indicate that the translog cost frontier is a flexible functional form and provides second-order approximation to well-behaved cost frontier at the mean of

the data. It places no a priori restrictions on the substitution of inputs and allows the economies of scale to vary with the output level. The translog functional form of the stochastic frontier model can be expressed as:

$$lnY_i = \alpha + \sum_{i=1}^{N} \beta_1 lnX_i + \frac{1}{2}\sum_{i=1}^{N} \sum_{i=1}^{N} \beta_2 lnX_i \, lnX_i + v_i - u_i \qquad (4.16)$$

Chapter 5

Household survey and data collection

This chapter provides information on the household level survey conducted in Punjab province of Pakistan to collect data regarding microfinance participation. Section 5.1 gives a brief description of the study area. Section 5.2 gives the detailed information of the process of data collection. Section 5.3 provides descriptive statistics of the respondent households.

5.1 Study area

Punjab province of Pakistan was selected for the study because it is the most populous province and is the house for 56 percent of country's population. Moreover, it is the social, economic and political hub of the country. Punjab, meaning the land of five rivers is the most fertile and second largest province of the country by area. Proofs of existence of urban civilization since 2500 BC are also found in this area known as Indus basin civilization. Its share of total GDP ranges 51.8 to 54.7 percent and has largest demography and social and economic viability.

5.2 Sampling Procedure and data collection

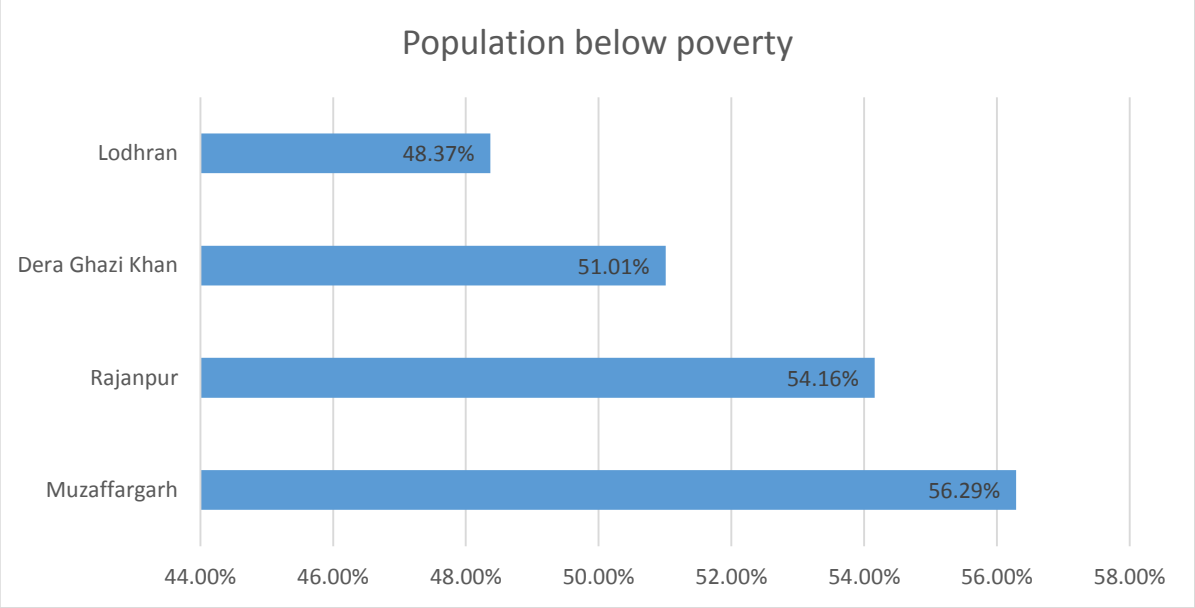
The data used for this study were collected from four districts by random sampling in Punjab Province (Muzaffargarh, Rajanpur, Dera Ghazi Khan and Lodhran). Out of 36 districts,

above mentioned 4 districts were selected on the basis of population below poverty line as shown in figure 5.2. Hence, these are the poorest districts in the province. These districts are the agricultural districts with a large number of microfinance banks, institutions and NGOs active in the area. The data were collected between August – September, 2012 using multistage sampling procedure. A series of meetings were held in these four districts to collect information on microfinance participation and its impacts.

Figure 5.1: Map of Punjab showing study area.

Source: en.wikipedia.org

Figure 5.2: Population below poverty



Source: Own representation.

Group discussions were held in two locations in each district to pretest the questionnaire and to collect general information on microfinance participants and other aspects needed keeping in view the objectives of this study. Second stage of sampling involved selection of villages in the sub-districts reflecting major agricultural ecologies and the presence of active borrowers from MF banks, MFIs and NGOs. Finally 426 households were randomly selected in proportion to the population in each district and subsequently in each sub-district.

407 questionnaires contained the complete set of information and were used in this study. Information on different aspects including respondent's location, infrastructure, personal information, access to credit, ownership of resources, sources of income, annual crop production, production technology of the crops sown, income and expenditure from and on livestock and poultry and household expenditure. The information was noted by

interviewing households using pretested questionnaire and with the help from trained enumerators.

From each household only one person, preferably the most influential or the head of the house was interviewed. Before starting interview, the purpose of interview was explained in order to create a trust and friendly atmosphere.

Information about village level infrastructure was collected by asking the questions like if here is presence of road, electricity, factory or mill, input and output markets, schools, hospital and agriculture extension office etc. in the vicinity. Data about ownership of resources were also collected. Farmers were asked about the ownership of resources like land, tractor, cattle (cows/ buffaloes), TV, refrigerator, washing machine, sewing machine, bike, power bike, car/ jeep and cellphone etc.

5.3 Descriptive statistics of the rural households

A general overview of the socioeconomic characteristics of the respondents is shown in the table 5.1. It can be seen from the table that about 40 percent of the farmers participated in microfinance activities. Farm size shows the total area under cultivation in the possession of the households. Households in the sample are subsistent farmers with small land holdings having an average farm size 5.41 acres (2.2 hectare). Information about age shows that the respondents have on average 39.72 years of age representing the mostly the farmers are middle aged. It support the notion that younger and healthy house members prefer to work off farm, leaving behind the middle aged and the old ones. Education denotes the number of years, respondent has attended a school. The average number of schooling in the sample is

6.48 years indicating that most of the farmers have education up to primary level. Higher education is not very common in the area.

Farming experience is the number of years spent in farming and in the sample, the average number of years spent in farming is 19.17 years. As mostly the farmers are middle aged, so they have spent more number of years in the farming activities, hence they are highly experienced. Gender explains the biological representation of the households. As Pakistan is an Islamic country and women usually live under seclusion, it was quite difficult to interview a lady respondent by a male enumerator. So, in our data set around 99 percent respondents are male.

Family size defines the total number of family members living together. The average number of family members in the sample were about 11 with on an average 3 kids going to school. In the rural areas, where people are not well educated, the family size is often bigger. Same was the case with our study area. Nonfarm participation means that family members do not work on own or someone other's farm but work at some factory or mill. 34 percent of the farm households were engaged in nonfarm activities. Nonfarm activities are more attractive as the source of income is regular, that's why rural households tend to engage in off farm activities.

Presence of factory or mill in the village and access to output market are the locational variables which show the infrastructure in the vicinity. Better infrastructure helps in increasing household welfare. Cultivated land, ownership of tractor, cattle and sewing machine are income generating high values assets and play an important role in the rural economy. In our sample only 21 percent of the farmers own tractor and on an average each household has three cows or buffaloes, showing that respondents are resource poor.

Table 5.1 descriptive statistics of the rural households.

Variable	Description	Sample Mean	Sed. Dev.
ngo	Presence of NGO in the vicinity (1=yes, 0= No)	0.32	0.47
age	Age of respondent (Years)	39.72	10.32
edu	Education of respondent (Years)	6.48	4.65
frmexp	Farming Experience of the respondent (Years)	19.17	12.06
gender	Gender of the respondent (1=Male, 0= Female)	0.99	0.11
civilstatus	Civil status of respondents (1=married, 0 otherwise)	0.88	0.32
fammem	Number of family members	10.79	4.51
kidsch	Number of kids enrolled at school	3.03	1.89
nfpart	Family members working off-farm (1=Yes, 0= No)	0.34	0.48
mfprt	Participation in Microfinance (1=Yes, 0= No)	0.40	0.58
factmill	Presence of factory/ mill in the vicinity	0.73	0.44
otpmrk	Presence of output market in the vicinity	0.40	0.49
cultilnd	Cultivated land (Acres)	5.41	5.53
tractor	Ownership of a Tractor (1=Yes, 0= No)	0.21	0.41
cowbuf	Ownership of a cow/ buffalo (1=Yes, 0= No)	3.10	2.60
sew	Ownership of a sewing machine (1=Yes, 0= No)	0.78	0.41
location1	1 if farmer is located in Muzaffargarh, 0 otherwise	0.41	0.49
location2	1 if farmer is located in D G Khan, 0 otherwise	0.26	0.44
location3	1 if farmer is located in Rajan Pur, 0 otherwise	0.16	0.37
1ocation4	1 if farmer is located in Lodhran, 0 otherwise	0.17	0.38

A major constraint in microfinance participation, according to the respondents is the non-availability of collateral to be offered to commercial banks for getting loans necessary for crop production. Around 56 percent of the farmers had no title of the land and hence they

were unable to borrow from commercial banks. In about 35 percent of the villages microfinance facility was not available. Going to the other village or to the city for availing microfinance needs time and resources. According to the respondents the transaction cost was higher if the microfinance facility was not available at village level.

Chapter 6

Empirical results

This chapter is subdivided into three main sections. Section 6.1 presents the empirical results of impact of microfinance participation on household welfare. We estimated per head expenditure, poverty gap and severity of poverty as welfare indicators. Section 6.2 shows the empirical results of the participation in microfinance and its impact on technical efficiency on farm households. Section 6.3 describes the results of impact of microfinance participation on wheat production. We estimated fertilizer use as input and yield and net returns of the cotton crop in rural Punjab of Pakistan. Fertilizer includes urea and DAP, as both the fertilizers are the main input for the crop and the prices are almost same in the population.

6.1 Participation in microfinance and its impact on welfare

In this study participants are the households who participated in any of the microfinance program introduced in the vicinity either by some NGO, microfinance bank or any institution. Non participants are the households who did not participate in the microfinance programs.

6.1.1 Outcome variables of the model

The outcome variables in this analysis are per head expenditure, poverty gap and severity of poverty. We measured these variables as follows:

6.1.1.1 Per head expenditure

Per head expenditure is the ratio of total expenditure to the total population. In our case, we estimated all the expenditure of the household during the year including expenses on food, health, clothing, repair and construction of house, transportation, spending on marriages, funerals and festivals, and charity etc. These expenditures also included purchases of farm inputs, payments for the rented land, salary to the servants (if any), medicine for the cattle and markup for the loans. Per head expenditure then was calculated by dividing gross expenditure by the number of total family members as shown below:

$$Per\ head\ expenditure = \frac{Gross\ expenditure}{No.of\ family\ members}$$

6.1.1.2 Poverty gap

The poverty gap is an improved measure of poverty as compared to poverty headcount ratio which measures the number of people below poverty line whereas poverty gap estimates that how far the poor are from the poverty line Grusky and Kanbur (2006). Poverty gap is defined as follows:

$$\text{PG} = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - y_i}{z}\right]$$

here y_i is the income of individual $_i$, the sum is taken of the individuals who fall below poverty line and z is the poverty line. So, poverty gap is the statistics that estimates the extent of resources required for poor to help them out of poverty.

This measure shows the mean proportionate poverty gap where non poor households have zero poverty gap. Researchers and scientists use this measure as it is helpful in describing the cost of eliminating poverty with the comparison to the poverty line. It defines that how much should be invested for the poor to bring their financial status above poverty line (World Bank, 2005). The poverty gap gives the information about the shortfall in income for the population, from the poverty line (World Bank, 2009). The poverty gap is an important measure to estimate aggregate poverty in a country.

Poverty gap ignores the effect of inequality between the poor. It does not capture differences in the severity of poverty amongst the poor. Sen (1985) stated that poverty gap simply describes the number of the poor below the poverty line, but the qualitative information it provides is limited.

6.1.1.3 Severity of poverty

Severity of poverty is the squared poverty gap. This measure was introduced by Foster, Greer and Thorbecke (1984) and is not widely used because it is not easy to interpret. As stated earlier, poverty gap estimates the distance separating the household and severity of poverty is the square of that distance from the poverty line. Poverty gap is weighted by itself while taking the square. It gives more weight to the very poor, falling too below the poverty line (World Bank, 2005a). It is calculated as follows:

$$P^2 = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - y_i}{z}\right]^2$$

here y_i is the income of individual $_i$, the sum is taken of the individuals who fall below poverty line and z is the poverty line as stated above. Apart from taking into account the distance separating the poor from the poverty line, severity of poverty describes the inequality among the poor as well. Thus a higher weight is given to the households which are far away from the poverty line (too poor).

6.1.2 Impact evaluation

Impact of microfinance in this section is examined on three variables as explained above. Tables 6.1, 6.2 and 6.3 explain the full information maximum likelihood estimates of the endogenous switching regression model for joint estimation of participation and impact of participation.

The estimates of determinants of microfinance participation are reported in selection equation columns of tables 6.1, 6.2 and 6.3. These estimates are the first stage Probit regression. Although the results in the three tables slightly differ because of different specifications, the empirical results in the three tables are more or less the same and therefore are interpreted jointly. These results can be interpreted as standard binary probability model.

The coefficient representing age of the household head in all the cases is negative and statistically significant suggesting that old age individuals have lower probability to participate in microfinance programs than young individuals. It indicates that young farmers

are more willing to participate in microfinance as they are risk averse. The negative coefficient of education of household head indicates the inverse relationship between education and participation in microfinance programs. The individuals who have more number of schooling years lend less and are capable of generating their own income from nonfarm services sector.

The coefficient representing farming experience of the household head is positive and significant, suggesting that the households with more number of years of farming experience have higher probability of participation in microfinance programs as farming experience increases the marginal value of time. With the increase in school enrollment of children, the probability of household to take loan from microfinance institute due to higher education expenses also increases. In rural areas where credit markets are imperfect, poor households face financial difficulties to educate their children (Edmonds, 2006; Ersado, 2005; Thorbecke & Charumilind, 2002).

Nonfarm participation decreases the probability of microfinance participation as nonfarm sector is high rewarding sector as compared to typical agriculture sector. Presence of small scale industry (factory or mill) and output market are the indicators of village infrastructure and are associated with higher likelihood of participation in microfinance. Better infrastructure reduces transaction costs and increases efficiency with which rural labor and financial markets channel inputs into high yielding activities by declining cost of information and transport.

The households endowed with valuable physical capital like cultivated land, tractor and livestock are less likely to participate in microfinance programs. The households have probability to capitalize their valuable assets in order to smooth consumption in times of

income shortfalls (Fafchamps *et al.,* 1998; Abdulai and CroleRees, 2001; Corral and Reardon, 2001; Lanjouw *et al.,* 2001; Dercon, 2002; Barrett *et al.,* 2005; Verpoorten, 2009). Since endowment with valuable assets represents the household's wealth, these assets can be used as collateral to get bigger loans from the commercial lending institutes.

Table 6.1. Endogenous Switching Regression Results for MF Participation and its Impact on Per Head Expenditure

		Per head expenditure	
Variable	Selection	Nonparticipants	Participants
Ngo	2.130(0.2058)***		
Edu	-0.054(0.026)**	0.0001(0.003)	0.001(0.005)
Age	-0.135(0.064)**	0.011(0.009)	-0.003(0.101)
fammem	-0.063(0.030)**	-0.037(0.004)***	-0.021(0.005)
kidsch	0.369(0.070)***	0.012(0.016)	0.004(0.015)
cowbuf	-0.060(0.053)	0.016(0.006)***	0.029(0.013)**
tractor	-1.213(0.275)***	0.162(0.042)***	0.254(0.129)*
Tv	-0.127(0.199)	0.053(0.025)**	-0.045(0.039)
cultilnd	-0.055(0.030)*	0.028(0.005)***	0.032(0.010)***
facmil	0.208(0.215)	0.028(0.025)	0.051(0.030)
famlab	-0.191(0.207)	-0.065(0.028)**	-0.032(0.033)
loc1	-0.186(0.232)	-0.005(0.026)	-0.015(0.033)
loc2	-1.063(0.250)***	-0.122(0.032)***	-0.046(0.044)
loc3	-1.183(0.307)***	-0.029(0.038)	-0.049(0.060)
_cons	3.146(1.270)**	2.037(0.201)***	2.100(0.181)***
σ_{1D}			0.140**
σ_{0D}		0.145**	
ρ_{1D}			-0.253
ρ_{0D}		-0.248***	
Log likelihood	-73.879		
Likelihood ratio test of independent equations $x^2(1)$	6.2***		

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

Table 6.2: Endogenous Switching Regression Results for MF Participation and its Impact on Poverty Gap

		Poverty gap	
variable	Selection	Nonparticipants	Participants
ngo	2.122(0.214)***		
edu	-0.129(0.065)**	-0.335(0.304)	-0.532(0.431)
age	-0.056(0.025)**	-0.909(0.930)	0.108(0.998)
fammem	-0.070(0.028)***	1.700(0.345)***	1.929(0.453)***
kidsch	0.383(0.069)***	-0.811(0.911)	-0.694(1.037)
cowbuf	-0.063(0.054)	-0.923(0.562)	-2.825(1.256)**
tractor	-1.229(0.353)***	-10.248(2.295)***	-11.558(6.712)*
tv	-0.125(0.200)	-7.466(2.953)***	9.924(3.701)***
cultilnd	-0.057(0.033)*	-0.430(0.184)**	-2.052(0.792)***
facmil	0.188(0.209)	-0.814(2.371)	-6.267(3.078)**
famlab	-0.195(0.205)	2.405(2.732)	3.915(3.343)
loc1	-0.208(0.234)	2.331(2.507)	0.908(3.135)
loc2	-1.102(0.252)***	6.505(2.825)**	11.936(4.179)***
loc3	-1.211(0.315)***	1.651(3.873)	11.680(5.829)**
_cons	3.127(1.284)**	26.896(17.950)	15.528(19.002)
σ_{1D}			14.475***
σ_{0D}		13.644***	
ρ_{1D}			0.259
ρ_{0D}		0.226***	
Log likelihood	-1725.720		
Likelihood ratio test of independent equations $x^2(1)$	4.40***		

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

Table 6.3: Endogenous Switching Regression Results for MF Participation and its Impact on Severity of Poverty

		Severity of poverty	
variable	Selection	Nonparticipants	Participants
Ngo	2.042(0.206)***		
Edu	-0.054(0.025)**	-0.001(0.001)	0.003(0.004)
age	-0.126(0.066)*	-0.007(0.006)	0.011(0.005)**
fammem	-0.066(0.028)**	0.003(0.002)	0.006(0.003)**
kidsch	0.377(0.068)***	-0.008(0.007)	-0.024(0.008)***
cowbuf	-0.073(0.057)	-0.003(0.002)	-0.016(0.007)**
tractor	-1.223(0.354)***	0.003(0.23)	0.053(0.066)
tv	-0.137(0.198)	-0.012(0.001)***	0.014(0.019)
cultilnd	-0.060(0.033)	-0.002(0.001)**	-0.002(0.003)
facmil	0.172(0.206)	-0.028(0.018)	-0.015(0.016)
famlab	-0.200(0.206)	0.018(0.020)	0.035(0.024)
loc1	-0.191(0.228)	0.007(0.014)	0.029(0.015)*
loc2	-1.015(0.247)***	0.035(0.017)**	0.031(0.024)
loc3	-1.096(0.309)***	0.018(0.028)	0.013(0.027)
_cons	3.050(1.285)**	0.066(0.137)	-0.227(0.080)***
σ_{1D}			2.421***
σ_{0D}		2.370***	
ρ_{1D}			0.432
ρ_{0D}		0.092***	
Log likelihood	-242.983		
Likelihood ratio test of independent equations			
$x^2(1)$	8.83***		

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

The last two columns of the tables 6.1, 6.2, and 6.3 show the results of second part of FIML endogenous switching regression model. Identification of the model suggests the presence of minimum one variable in the participation equation that does not appear in outcome equations. In all the three scenarios, the presence of office of NGO in the village is used as identifying instrument.

The significance of covariance terms σ_{0D} and σ_{1D} in the lower panels in the case of per head expenditure (Table 6.1), poverty gap (Table 6.2), severity of poverty (Table 6.3), shows the presence of endogenous switch in all cases. Also results show that the covariance terms σ_{0D} and σ_{1D} have same signs, which indicates that microfinance participation is based on hierarchical sorting, meaning that it is suitable for the participants to participate in microfinance programs who have above average returns. Whereas, it is not better for those to participate who already have returns below average. The significance of ρ_{0D} indicates that in the absence of microfinance, there would be significant difference in average behavior of household in the two groups, caused by unobserved effects. Likelihood ratio test for independent equation is also reported in the tables. The results show that the model performed excellently well in explaining the determinants of microfinance participation and differential impact of explanatory variables on per head expenditure, poverty gap and severity of poverty for both, participants and non-participants. The correlation coefficients $\rho_{1D}$and ρ_{0D} are both negative but are significant only for the correlation between the non-participation equation and the selection equation in case of per head expenditure. Since ρ_{0D} is negative and significantly different from zero, the model suggests that individuals who choose to not to participate in microfinance programs spend less than a random individual from the sample.

Table 6.2 shows that the number of family members have a negative impact on per head expenditure in case of both participants and non-participants, suggesting that as more the members in the family, less are the per head expenses and hence large family size decreases the household welfare as increases the burden on family head. The presence of factory or mill and output market in the vicinity have a positive and significant impact on the per head expenditure in the case of participants of the microfinance. The coefficients of variables presenting the presence of the valuable assets like cultivated land, ownership of tractor and livestock are positive and significantly different from zero for both participants and non-participants suggesting that in the presence of these income generating assets, there is a positive impact on per head expenditure and these assets tend to increase income and income is positively related to expenditure.

Table 6.2 and 6.3 show that the variable presenting total number of household has a significant and positive effect on poverty gap and severity of poverty in both cases suggesting that more the numbers of family members, more is the poverty gap and severity of poverty. The variables showing infrastructure, the presence of factory or mill and output market are negative and statistically significant show that in the presence of better infrastructure, income earning capacity of participants increases and hence they tend to decrease the poverty gap and severity of poverty, albeit its effect is inconclusive for non-participants. The variables presenting valuable assets have negative sign and the coefficients are statistically different from zero suggesting that physical capital tends to decrease the poverty gap and severity of poverty for both participants and non-participants. The presence of sewing machine also tends to shorten the poverty gap and severity of poverty.

Table 6.4: Average treatment effects of microfinance participation

Indicator	Mean Outcome		ATT	Change (%)
	Participants	Non participants		
PHE	2.265	2.002	0.263***	13.14
PG	0.189	0.224	-0.035***	15.63
SoP	0.042	0.069	-0.027***	39.13

***Significance at the 1 % level. (PHE: Per head expenditure, PG: Poverty gap, SoP: Severity of poverty.)

Table 6.4 shows the impact of microfinance participation on per head expenditure, poverty gap and severity of poverty. The results show that participation in microfinance increased per head expenditure by 13.14 percent and decreased poverty gap and severity of poverty by 16.52 and 39.13 percent respectively. Thus microfinance appears to have positive effects on the welfare and alleviating poverty status of rural households.

6.1.3 Concluding remarks

This section estimates the determinants and impact of microfinance on rural household welfare by utilizing cross sectional rural household level data of 407 households belonging to the four poorest districts of Punjab province of Pakistan. The casual impact of microfinance participation is estimated by using endogenous switching regression model that controls selection bias both due to observable and non-observable factors.

The results indicate that education of household head decreases the likelihood of microfinance as educated individuals have more access to high return income generating activities. Good physical infrastructure, like factory, output market in the village can enable households to engage in more in microfinance program. Wealthy households have higher probability of participation in microfinance programs as they have probability to capitalize their valuable assets in order to smooth consumption in times of income shortfalls and also due to the fact that these assets can be used as collateral to get bigger loans from the commercial lending institutes. School enrollment of children increases the probability of household to take loan from microfinance institute due to financial constraints in the presence of imperfect credit market.

The results show that participation in microfinance decreases per head expenditure and increases poverty gap and severity of poverty. Our estimation suggests that microfinance helps to increase welfare of rural household. The relationship between farm size and access to credit may create some policy dilemmas as poor farmer with less physical assets cannot get loans due to compulsory collateral requirement in financial institutes. The policy makers should focus to overcome existing social and economic barriers to get access to credit. Government should target the poor people to encourage them to engage in productive activities by decreasing liquidity constraints.

6.2 Impact of microfinance on farmer's technical efficiency

This section evaluates the impact of microfinance participation on technical efficiency of participants and nonparticipant farmers of microfinance. We employed stochastic frontier

production function for empirical estimation. We used household level data collected from four districts of Punjab Province of Pakistan. The outcome of translog stochastic frontier production function reveal that microfinance participation helps increasing technical efficiency of small households.

6.2.1 Results of maximum likelihood parameter estimates of the stochastic production frontier

Table 6.5 shows the results of maximum likelihood parameter estimates of the stochastic production frontier for wheat. The estimated value of lambda (γ) is 0.956 which shows that there is difference between observed and frontier output because of the difference in technical inefficiency of the sample farmers. There is 95% variation in output as a result of variation in technical efficiency of the farmers.

The results show that the participation in microfinance programs, age of the respondent, education, application of fertilizer, household and farm size have a positive impact on the efficiency. The negative signs show that the variable is decreasing inefficiency and hence technical efficiency is being increased whereas positive signs show that the inefficiency is being increased.

The negative and significant coefficient of the microfinance participation variable shows that the households who join the microfinance programs tend to decrease technical inefficiency. The variable depicting the age of the respondent also shows the similar results. Negative and significantly different from zero coefficient shows that the technical inefficiency decreases when the farming person is an old man as compared to the young ones. The reason

behind this is that the young people can also get themselves engaged in off farm activities and can earn better livings and hence pay less interest in farming. This notion is confirmed by the estimates of parameter of non-farm participation. The significant and positive value of the coefficient shows that participation in non-farm work increases the technical inefficiency of the farmers. The farmers who work off-farm may have an option to get higher wage rates, usually they are skilled workers and hence have comparative advantage working off-farm. The coefficient of the variable representing education of the respondents has a positive value proving that in accordance to the human development theory, the more educated person can perform better and can reduce the level of technical inefficiency but non-significance shows that in this particular case if the farmers are educated ones and possess some skill, they move to off-farm jobs on the basis of higher expected returns as discussed above.

Table 6.5: Maximum likelihood estimates for parameters of translog stochastic frontier production function for wheat farmers in Pakistan.

Variable	Parameter	Coefficient	Standard Error
Constant	β_0	0.034***	0.005
ln(land)	β_1	-0.007	0.009
ln(ploughing)	β_2	0.044***	0.009
ln(soil type)	β_3	0.018***	0.004
ln(irrigation)	β_4	0.031**	0.015
ln(fertilizer)	β_5	0.125***	0.009
ln(weedicide)	β_6	0.017	0.013
ln(self-labor)	β_7	0.000	0.002
$0.5(\ln(\text{land}))^2$	β_{11}	-0.023*	0.012
$0.5(\ln(\text{ploughing}))^2$	β_{22}	-0.033	0.033
$0.5(\ln(\text{irrigation}))^2$	β_{44}	0.086	0.096
$0.5(\ln(\text{fertilizer}))^2$	β_{55}	-0.034	0.022
0.5(ln(land) x ln(ploughing))	β_{12}	0.062*	0.033
0.5(ln(land) x ln(soil type))	β_{13}	0.024*	0.010
0.5(ln(land) x ln(irrigation))	β_{14}	0.043	0.051
0.5(ln(land) x ln(fertilizer))	β_{15}	-0.025	0.027
0.5(ln(land) x ln(weedicide))	β_{16}	-0.088***	0.031
0.5(ln(land) x ln(self-labor))	β_{17}	-0.008	0.011
0.5(ln(ploughing) x ln(soil type))	β_{23}	-0.012	0.017
0.5(ln(ploughing) x ln(irrigation))	β_{24}	-0.068	0.070
0.5(ln(ploughing) x ln(fertilizer))	β_{25}	0.050	0.038
0.5(ln(ploughing) x ln(weedicide))	β_{26}	0.115**	0.051
0.5(ln(ploughing) x ln(self-labor))	β_{27}	0.012	0.015
0.5(ln(soil type) x ln(irrigation))	β_{34}	-0.027	0.027

0.5(ln(soil type) x ln(fertilizer))	β_{35}	0.015	0.013
0.5(ln(soil type) x ln(weedicide))	β_{36}	0.039	0.030
0.5(ln(soil type) x ln(self-labor))	β_{37}	0.005	0.005
0.5(ln(irrigation) x ln(fertilizer))	β_{45}	0.164**	0.075
0.5(ln(irrigation) x ln(weedicide))	β_{46}	-0.073	0.077
0.5(ln(irrigation) x ln(self-labor))	β_{47}	-0.019	0.024
0.5(ln(fertilizer) x ln(weedicide))	β_{56}	-0.068	0.057
0.5(ln(fertilizer) x ln(self-labor))	β_{57}	0.009	0.013
0.5(ln(weedicide) x ln(self-labor))	β_{67}	-0.045***	0.016
Inefficiency model			
Constant	δ_0	-5.578***	1.683
Microfinance Participation	δ_1	-2.095***	0.624
Age	δ_2	-0.652***	0.023
Education	δ_3	-0.049	0.049
Fertilizer	δ_4	-3.168***	0.774
NF Participation	δ_5	1.041*	0.568
Household Size	δ_6	-0.042	0.047
Farm size	δ_7	-0.087	0.355
Soil Type	δ_8	1.433	0.867
Irrigation	δ_9	0.285	0.247
	δ_s^2	0.011***	0.000
	γ	0.956***	0.004

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

The estimate of the parameter fertilizer is negative and statistically significant and different from zero indicating that the use of fertilizer significantly decreases the inefficiency level. The negative sign of the coefficient of the size of household reveals that more the number of family members, less likely is the inefficiency. More number of members in the

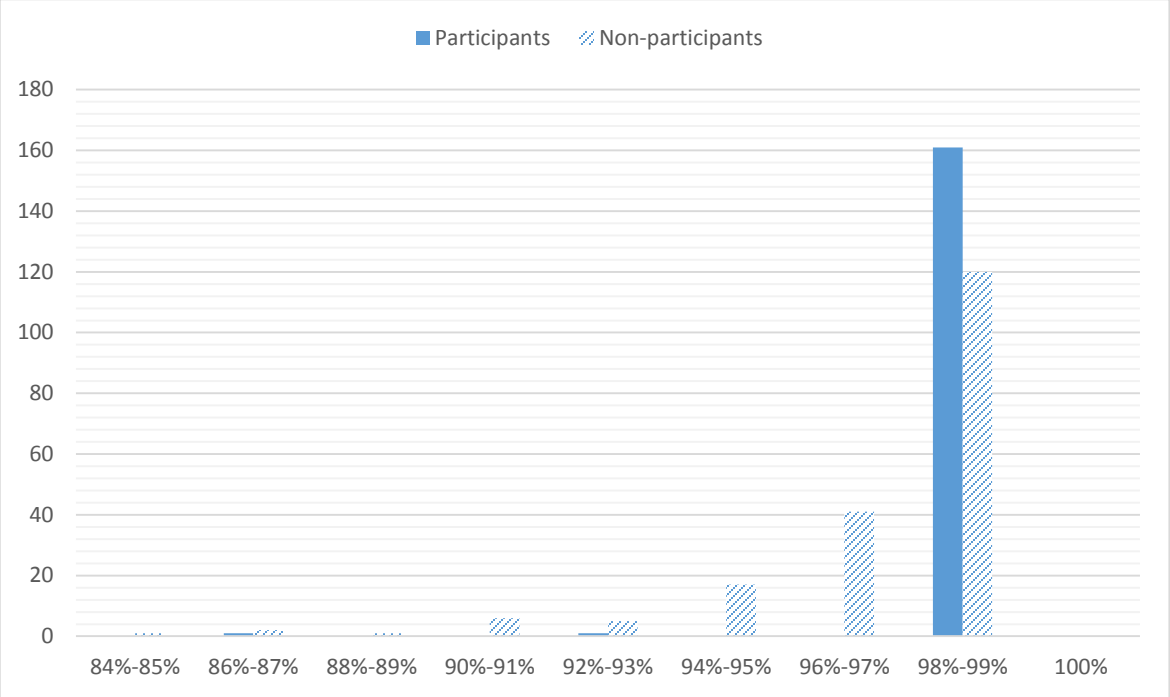
family help in providing free of cost labor in wheat cultural practices like irrigation, application of fertilizers, harvesting, threshing and storage and in this way larger families reduce technical inefficiency. The non-significant value of the estimate indicates that larger household size has an extra burden on the economic condition and compels household members to seek off farm work for smooth consumption.

The estimates of the farm size parameter show negative sign implying that bigger the size of the farm, more likely is the reduction in technical inefficiency. Larger farms may be less productive as compared to the small ones but technically they may be more efficient. The coefficients of the soil type and irrigation variables are positive and insignificant suggesting that soil type and irrigation have a positive effect on inefficiency. When farmers know that their land is a fertile one, they put less efforts to get maximum yield and also they can apply less fertilizers or they can also cut their expenses short by tolerating cultural practices. Wheat crop usually requires 4-5 irrigations but in the sample mean value of number of irrigations is 6.65 ranging between 4 -12. Both these factors lead to negative impact on the yield and increase the level of technical inefficiency.

6.2.3 Distribution of Technical Efficiency

Figure 6.1 shows the distribution of the technical efficiency of the both households, participants and non-participants. Technical efficiencies of participants range from 86 to 99 percent and that of non-participants range from 84 to 99 percent.

Figure 6.1 Distribution of Technical Efficiencies of Participants and Non participants of Microfinance.



Source: Own representation.

6.2.4 Conclusion and Policy Recommendation

This study used household level data for wheat production in the year 2012 in four districts from Punjab province in Pakistan to estimate the technical efficiency of farmers with and without microfinance. The basic objective of this study was to investigate whether participation in microfinance increases the technical efficiency of poor and vulnerable small wheat farmers of Punjab province.

The outcome of the translog stochastic frontier function reveals that participation in microfinance programs is an important determinant of the technical efficiency of the rice farmers. The household who participated in these programs have higher technical efficiency

as compared to that of the non-participants. Age and education of the household head also plays an important role in the technical efficiency of the wheat farming. Results reveal that the age and education of the household head has a positive impact on the technical efficiency. This is in accordance to the human capital development theory as with the education and age one learns more, gains experience and can perform better.

Number of family members and the size of the farm also play an important role on the technical efficiency. Larger the number of family members, more is the availability of labor for work on the farm and bigger the size of farm, lesser is per unit cost of production. The results depict a negative impact of soil fertility on the technical efficiency and overall yield of the wheat crop suggesting that in case of fertile lands, farmers may use less fertilizers and do not pay attention to cultural practices. Same is the case with irrigation. The information collected from households shows that farmers usually apply more than required number of irrigations which promote vegetative growth of the plants and as a result grain yield decreases significantly.

Application of fertilizer overall has a positive impact on the yield and technical efficiency. It suggests that farmers having low efficiencies are not using appropriate amount of fertilizers. Nonfarm work has a negative impact on the technical efficiency for the reason that non-farm works is a source of regular and higher income as compared to on-farm work. Household members engaged in non-farm work are less likely to participate in on-farm work.

Overall this study suggests that microfinance is an important factor in the lives of small and poor farmers. Microfinance helps in achieving higher level of technical efficiency, so

governments and policy makers must consider to promote microfinance and make credit easily accessible. Agriculture field officers and extension workers should visit the farms and inform the farmers about the optimum use of inputs.

6.3 Impact of microfinance on fertilizer, yield and net returns

This section evaluates the impact of participation in microfinance programs on fertilizer use, cotton yield and net-returns, using cross sectional data collected from 348 cotton growers belonging to four most poor districts of Punjab Province of Pakistan. We used ESR model and employed FIML estimator to account for potential endogeneity. The results of the analysis reveal that participation in microfinance programs has a significant and positive impact on fertilizer use, cotton yield and net returns in rural Punjab. Participants of microfinance apart from having small farm size and being resource poor have higher per acre cotton yield and net-returns and utilize more fertilizers as compared to nonparticipants. This confirms the potential role of microfinance in household welfare and poverty alleviation.

Table 6.6 shows the differences in characteristics of participants and nonparticipants of microfinance with their t-values. The table shows that participants and nonparticipants of microfinance do not have the similar farm level and household characteristics. The average yield of participants of microfinance is 2.59 monds higher than that of nonparticipants indicating significant difference. This significant difference shows that participation in microfinance program has significant impact on increase in yield. Same is the case in net returns. Participants of microfinance have 2743.02 PKR higher returns than that of

nonparticipants. Also there is no difference in case of urea and DAP. Participants are using more of the both fertilizers as compared to nonparticipants.

Table 6.6: Farm and Household characteristics of participants and nonparticipants of microfinance.

Variable	Non-participants	Participants	Difference
Yield	13.56	16.15	2.59***
Netret	11493.69	14236.71	2743.02***
Urea	2.38	2.62	0.24***
Dap	1.21	1.36	0.15***
Distinp	1.25	0.41	-0.84***
Farmsize	6.57	3.29	-3.26***
Edu	7.67	5.69	-1.98***
Age	41.58	34.55	-7.04***
Hhsize	10.82	12.04	1.22**
Kidsch	2.81	3.67	0.86***
Tractor	0.36	0.06	-0.30***
Tv	0.67	0.71	0.04
Nfprt	0.68	0.22	-0.46***

**Significance at the 5 % level; ***Significance at the 1 % level.

In case of farm size, nonparticipants have bigger areas under cultivation as compared to participants. Same is the case in ownership of tractor and television. Nonparticipants also participate in nonfarm activities more than participants. Table 6.6 gives us a clear idea of the difference in household and farm characteristics of the participants and nonparticipants but it is not sufficient to explain participation decision and true impact among participants and nonparticipants as it does not account for the impact of other characteristics. In the coming section we model participation in microfinance as a selection process which is based on the expected benefits of participation.

6.3.1 Results of the estimated ESR model on participation and impact of participation on fertilizer (urea and DAP), cotton yield and net returns

The results of the estimated ESR model on participation and impact of participation on fertilizer (urea and DAP), cotton yield and net returns are presented in Tables 6.7, 6.8, 6.9 and 6.10 respectively, we employed full information maximum likelihood approach which estimates participation and outcome equations simultaneously. The second columns of the four tables represent the results of participation equation which can be interpreted as normal Probit coefficients. The results of the selection equations are slightly different because of different specifications in the model. We will discussed them together as in all specifications the variables having same names are statistically similar.

The variable representing nonfarm participation of farmers is negative and statistically different from zero, suggesting that farmers participating in nonfarm activities are less likely to participate in microfinance programs.

The farm size variable is also negative and statistically significant in all four specifications indicating that bigger farm size is inversely linked to the microfinance participation. The result is in line with Weber and Musshoff, (2012) and Obike and Osundu, (2013).

The negative and significant value of the coefficient of household size in tables 6.7 and 6.8 suggests that larger households are less likely to participate in microfinance programs. Studies by Lawal *et al.,* (2009) and Sarker and Islam, (2014) support our findings. The results also resemble with the findings of Pasha and Negese, (2014) who noticed that larger family size is positively related to the loan default. There is a long list of past studies who support that larger household size is positively associated with the loan (Weber and Musshoff, 2012) but in our case the land holdings are small and subsistence farming is very common. It is not wise to engage all the family members in a small piece of land. So, members of the farm household prefer to participate in off-farm activities which provide households a regular source of income leading to economic stability.

Distance of the farm from input market is an important variable which gives information about the transaction cost of buying inputs. The coefficient of the distance of input market is also negative and significantly different from zero, suggesting that households having their farms far from the input market are less likely to participate in microfinance. This result supports the notion that when farms are located at higher distances

from input markets, the input cost rises because of transportation and time constraint. Participation in microfinance is hence not suitable under these conditions.

Table 6.7: ESR results for determinants of participation in microfinance and its impact on urea use.

Variables	Selection	Non-participants	Participants
Ngo	2.374(0.342)***		
Age	0.008(0.094)	-0.030(0.034)	0.095(0.042)**
age2	-0.001(0.001)	0.0001(0.0001)	-0.001(0.001)
Edu	-0.020(0.034)	0.035(0.012)***	0.040(0.013)***
Nfrt	-0.837(0.260)***	-0.146(0.103)	0.398(0.125)***
farmsize	-0.107(0.032)***	0.017(0.010)*	0.011(0.018)
Hhsize	-0.053(0.032)*	-0.019(0.011)*	-0.010(0.013)
distancein~t	-0.150(0.060)**	-0.024(0.017)	0.021(0.034)
factorymill	0.095(0.248)	-0.059(0.088)	0.006(0.102)
Kidsch	0.297(0.080)***	0.048(0.030)	0.009(0.029)
soilquality	-0.381(0.229)*	0.069(0.100)	0.252(0.104)**
Tractor	-1.155(0.357)***	0.324(0.111)***	-0.333(0.206)
Tv	0.353(0.240)	0.009(0.095)	0.120(0.129)
location1	-0.066(0.393)	0.084(0.108)	0.007(0.136)
location2	-1.086(0.454)**	0.198(0.120)*	0.055(0.154)
location3	-1.015(0.481)**	0.208(0.158)	0.130(0.184)
constant	0.612(1.829)	2.630(0.721)***	0.237(0.775)
σ_{1D}			0.523(0.027)***
σ_{0D}		0.498(0.038)***	
ρ_{1D}			0.448(0.216)**
ρ_{0D}		-0.461(0.297)	
Likelihood ratio test of independent equations X^2		4.94***	

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

Table 6.8: ESR results for participation in microfinance and its impact on DAP use.

Variables	Selection	Non-participants	Participants
Ngo	2.360(0.340)***		
Age	0.037(0.097)	-0.028(0.025)	0.030(0.026)
age2	-0.001(0.001)	0.000(0.000)	0.000(0.000)
Edu	-0.020(0.035)	0.020(0.009)**	0.020(0.009)**
nonfarmparti	-0.848(0.265)***	-0.055(0.075)	0.254(0.080)***
farmsize	-0.109(0.032)***	0.006(0.007)	0.002(0.011)
Hhsize	-0.049(0.031)	-0.008(0.008)	-0.001(0.008)
distancein~t	-0.139(0.060)**	-0.019(0.013)	0.010(0.022)
factorymill	0.076(0.245)	-0.058(0.065)	-0.056(0.065)
Kidsch	0.287(0.080)***	0.041(0.022)*	-0.007(0.018)
soilquality	-0.392(0.228)*	-0.013(0.072)	0.112(0.066)*
Tractor	-1.130(0.359)***	0.208(0.082)**	-0.210(0.130)
Tv	0.340(0.240)	0.019(0.069)	0.066(0.082)
location1	-0.069(0.392)	0.063(0.079)	-0.001(0.086)
location2	-1.076(0.453)**	0.065(0.087)	0.078(0.098)
location3	-0.974(0.476)**	0.170(0.116)	0.075(0.117)
_cons	0.122(1.869)	1.586(0.527)***	0.519(0.492)
σ_{1D}			0.382(0.020)***
σ_{0D}		0.317(0.024)***	
ρ_{1D}			0.442(0.218)**
ρ_{0D}		-0.486(0.294)	
Likelihood ratio test of independent equations X^2		5.54***	

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

As discussed earlier that ESR requires at least one variable that in the participation equation, called instrument and this variable is not there in the outcome equation. In all four specifications, the presence of NGO in the vicinity variable is used as instrument. The presence of NGO in the vicinity is expected to influence participation decision of the households in microfinance programs but it has no effect on fertilizer use, cotton yield and net-returns.

ESR results of impact of microfinance participation on urea and DAP use are shown in third and fourth columns of tables 6.7 and 6.8 for nonparticipants and participants respectively. These estimates show the impact of personal, household and farm-level characteristics on fertilizer use for participants and nonparticipants. Again the estimates of impact on urea and DAP are more or less the same, so we will interpret them together and "fertilizer" will be used for both jointly.

The results show that the coefficients of variable depicting the number of years of formal education is positive and significantly different from zero in case of both, participants and nonparticipants suggests that education has a positive and significant impact on fertilizer use. This result resembles with Zhou *et al.,* (2010), who found that education affects the fertilizer use decision as education increases the level of information about the importance of proper amount of fertilizer use.

The positive and significant coefficient of nonfarm participation variable in case of participants shows that households who also take part in nonfarm activities increase the use of fertilizer. Nonfarm activities add more to the capital and farmers can invest in fertilizers. This result is in line with the findings of Mathenge *et al.,* (2013), who found that off-farm work has positive impact on fertilizer use in case of traditional cash crops.

The variable representing the enrollment of kids to the school has a positive and statistically significant coefficient in case of nonparticipants showing that nonparticipant households who send their kids to school use more fertilizer. It shows that nonparticipants of microfinance are resource rich and they invest in their kids' education and hence they can also invest in the fertilizer.

Soil quality variable is positive and statistically significant in case of participants indicating that participant households having fertile land invest more in fertilizer application in order to get higher yields. Moreover as described in descriptive statics, participants have lesser land holdings as compared to nonparticipants and the findings of Nkonya *et al.,* (1997). They discovered that larger farms are more likely to use less fertilizer las compared to smaller farms.

Ownership of tractor has a differential effect on participants and nonparticipants. The positive and significant value of the coefficient in case of nonparticipants indicates tends to have positive and significant impact on fertilizer use. Whereas the opposite specification in case of participants indicate the lesser use of fertilizers.

ESR results of impact of microfinance participation on cotton yield and net returns are shown in third and fourth columns of table 6.9 and 6.10 for nonparticipants and participants respectively. In both specifications age has a negative and significant impact on cotton yield and net returns suggesting that with the increase in age, the yield and net returns tend to diminish. These findings are in line with Dunn and Williams, (2000) who explored that with the increasing age, farmers' ability to participate in labor activities may decrease and in the old ages farmers cannot cope with the technological advancements which lead to the decline

in the average yield of their farm produce as compared to their younger and more energetic competitors.

Education of the farm household is very important ingredient of the yield and resulting net returns in agriculture. There are numerous studies that show positive impact of education on yield and net returns like, Hussain and Byerlee, (1995) and Lockheed *et al.,* (1980) in Asia, Phillips, (1994) in Latin America and Croppenstedt and Demeke, (1997) in Ethiopia. Our results also confirm the above findings. The positive and statistically significant value of the coefficient of variable representing education status of the farm households expresses that number of years invested in formal schooling have a positive and significant impact on yield and net returns.

Input markets play an important role in enhancing household productivity (Ayieko, 2006). Distance of the form from input market is a significant factor in explaining the availability of necessary crop growing and yield enhancing ingredients. In case when the households participate in microfinance programs, the negative and significant value of the coefficient shows a negative impact of distance on yield and net returns, meaning the higher the distance is, lower the yield and net returns will be. These results are in line with Chianu *et al.,* (2008).

Table 6.9: ESR results for determinants of participation in microfinance and its impact on cotton yield.

Variables	Selection	Yield	
		Non-participants	Participants
ngo	2.353(0.327)***		
age	-0.025(0.096)	-0.529(0.162)***	-0.249(0.116)**
age2	0.000(0.001)	0.006(0.002)***	0.002(0.002)
edu	-0.029(0.034)	0.289(0.058)***	0.393(0.038)***
nonfarmparti	-0.808(0.255)***	-0.474(0.492)	0.335(0.343)
farmsize	-0.105(0.032)***	0.027(0.046)	-0.019(0.047)
hhsize	-0.032(0.030)	-0.060(0.052)	0.098(0.036)
distancein~t	-0.151(0.058)**	0.024(0.082)	0.192(0.097)**
factorymill	-0.053(0.253)	-0.659(0.421)	0.281(0.290)
kidsch	0.278(0.077)***	-0.139(0.136)	-0.176(0.081)**
soilquality	-0.454(0.229)**	0.460(0.463)	-0.425(0.296)
tractor	-1.099(0.346)***	-0.514(0.528)	-0.013(0.579)
Tv	0.262(0.245)	0.088(0.452)	-0.733(0.370)**
location1	-0.121(0.381)	-0.111(0.516)	0.496(0.387)
location2	-1.173(0.443)**	0.623(0.571)	-0.286(0.438)
location3	-1.079(0.467)**	0.114(0.750)	-0.309(0.528)
_cons	1.384(1.884)	23.249(3.476)***	20.678(2.190)***
σ_{1D}			2.506(0.130)***
σ_{0D}		1.402(0.089)***	
ρ_{1D}			0.527(0.180)**
ρ_{0D}		-0.271(0.229)	
Likelihood ratio test of independent equations X^2		6.83***	

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

Table 6.10: ESR results for determinants of participation in microfinance and its impact on net returns.

Variables	Selection	Net Returns	
		Non-participants	Participants
ngo	2.351(0.327)***		
age	-0.024(0.096)	-424.017(140.208)***	-177.589(102.3410)*
age2	0.000(0.001)	4.808(1.659)**	0.795(1.419)
edu	-0.031(0.034)	236.562(50.076)***	346.530(33.054)***
nonfarmparti	-0.799(0.255)***	-364.890(425.415)	192.260(300.927)
farmsize	-0.106(0.032)***	36.605(39.490)	-2.327(41.146)
hhsize	-0.033(0.030)	-41.349(44.580)	90.194(31.865)*
distancein~t	-0.152(0.058)***	25.255(70.382)	186.461(85.688)**
factorymill	-0.054(0.253)	-526.067(362.908)	263.789(254.778)
kidsch	0.278(0.077)	-144.863(117.616)	-133.504(71.405)*
soilquality	-0.447(0.229)**	519.125(399.457)	-290.338(260.503)
tractor	-1.073(0.345)***	-265.792(455.828)	66.540(507.241)
Tv	0.246(0.246)	49.344(389.712)	-611.430(324.858)*
location1	-0.130(0.382)	-160.950(445.346)	362.395(341.021)
location2	-1.189(0.443)**	498.042(492.201)	-236.366(385.760)
location3	-1.087(0.467)**	212.275(646.672)	-245.558(464.238)
_cons	1.404(1.880)	19051.88(3002.09)***	17213.40(1925.855)***
σ_{1D}			2159.600(110.980)***
σ_{0D}		1234.395(73.039)***	
ρ_{1D}			0.516(0.182)***
ρ_{0D}		-0.296(0.228)	
Likelihood ratio test of independent equations X^2		6.76***	

*Significance at the 10 % level; **Significance at the 5 % level; ***Significance at the 1 % level.

The variable representing the presence of the factory or mill in the vicinity has a negative effect on the yield and net returns of the nonparticipants of microfinance. As we have already stated that nonparticipants are resource rich and in the presence of factory or mill in the vicinity, they prefer to invest their resources and human capital in off-farm activities which are usually high rewarding, lower is the risk and source of income is on regular basis. Presence of factory or mill in the vicinity has no effect on the yield and outcome of participants.

Presence of television in the house is no doubt a rich and reliable source of information but in case of participants, the coefficient is negative and significant meaning that it has negative impact on yield and net returns. Reference to the Stiglitz and Weiss (1981) when the loan has been disbursed, the borrower does not invest maximum time, energy and intention in the projects intended and prefers leisure activities. Spending too much time in watching television may have negative effects on the crop yield and net returns.

The significance of covariance terms $\rho_{P\mu}$ in the lower panels in the case of urea (Table 6.7), DAP (Table 6.8), cotton yield (Table 6.9) and net returns (Table 6.10), show the presence of endogenous switch in all cases. Also results show that the covariance terms $\rho_{N\mu}$ and $\rho_{P\mu}$ have alternative signs, which indicates that microfinance participation is based on comparative advantage.

Table 6.11: Average Treatment Effect of MF participation

Outcome	Mean value		ATT	Percent difference
	Participants	Non-participants		
Urea	4.251	3.263	0.988***	30.28
DAP	2.961	2.099	0.862***	41.06
Cotton Yield	17.952	14.032	3.920***	27.94
Net Returns	14451	11127	3324***	29.87

***Significance at the 1 % level.

Table 6.11 show the average treatment effect on treated. We can see from the table that ATT values of all the outcome variables are statistically significant and positive, showing that participation in microfinance helps 30.28 percent increase in use of urea and 41.06 percent DAP as compared to the nonparticipants, suggesting that microfinance participation has positive and significant effect on fertilizer use. Yield and net returns also show 27.94 and 29.87 percent increase in case of participants as compared to nonparticipants indicating that microfinance participation has positive impact on yield and net returns.

6.3.2 Conclusion

The study estimates the determinants of participation in microfinance program by utilizing data from farm households. The results indicate that age, education, family size and possession of value able assets play an important role on the participation of microfinance. Nonfarm participation, farm and household size and valuable assets have negative impact on participation in microfinance programs. Microfinance promises small scale credit amounts given for short terms. The richer households and the ones who already have a regular source of income, better as compared to participation in on farm activities prefer to borrow from

commercial banks and other lending institutions as they can have loans of bigger sizes and can offer their assets as collateral. But for the poor and small households who lack their assets to be offered as collaterals, microfinance is a valuable tool to get them out of their poverty by providing them capital in the form of microcredit. Moreover, the participation in microfinance as we have concluded from the results of welfare analysis, helps households increasing their per head expenditure, narrows the poverty gap bringing more households nearer to the poverty gap and hence helping them out of poverty.

In case of yield and net returns, results show that with the increase in age and farm size, yield and net returns decrease as the old ones are not innovative and rely on traditional methods of cultivation as stated above. Whereas, education, distance from the input market and household size are positively related to the yield and net returns.

Keeping the findings of the study, it is recommended that government should initiate microfinance programs for the poor households in order to increase their welfare and help them getting rid of the poverty. With the introduction of such programs households can grow better crops resulting in high yield and net returns. This will not only help them out of poverty but also will help increasing the volume of cotton imports and will add to GDP.

Chapter 7

Summary and conclusions

This study examines the determinants of microfinance participation and its impact on welfare indicators including per head expenditure, poverty gap, severity of poverty, use of fertilizer on cotton crop, cotton yield, net-returns and comparison of technical efficiency of households participating in microfinance programs and their counterfactuals. The study is based on the data collected by rural household survey in 2012 from four poorest districts of Punjab Province of Pakistan. The data consisted of 407 households containing information on personal, household, farm level and locational characteristics. The main objective of this study is to investigate the impact of microfinance on the lives and economics of small rural households. This chapter gives an overview of the methods applied, concludes the findings and policy implications.

7.1 Methodological issues

There are many studies which have examined the impact of microfinance on different welfare aspects in Pakistan. Like, Akram *et al.,* (2008) and Sial *et al.,* (2011) found that microfinance participation has positive effects on agricultural GDP and poverty alleviation. The data regarding these studies were collected only from few microfinance institutions which does not reflect the population as a whole. Ayuub (2013) conducted a study in Pakistan

and concluded that well developed microfinance sector is needed for the welfare but did not use any advanced econometric technique and results were based on averages and means.

This study is different from the previous studies in different ways: this is not a single or few institutions specific study. We did not focus on the microfinance institutions, NGOs or microfinance banks for data collection. We conducted a very basic village level survey in the sub-districts of four districts of Punjab Province. Our main emphasis was the participation in microfinance, regardless of institution. Data collected this way gives a homogenous mixture and represents the entire population.

Still there are studies in the other parts of the world investigating the impacts of microfinance like Coleman (2006). This study was conducted in Thailand and found positive impact of microfinance on savings, agricultural and livestock production and sale. In this case participation in microfinance program was not exogenous. Hence the results can be biased. In our study, we employed Endogenous switching regression using full information maximum likelihood estimator which accounts for observed and unobserved heterogeneity and calculates the determinants and impact in the single step reducing the chances of calculation bias. We also used stochastic frontier analysis using trans-logged form which gives better results as compared to Cobb-Douglas form.

7.2 Summary of results

The research contributes to the existing literature in three ways: first we analyzed the impact of microfinance on the welfare of small rural households and found promising results.

We used three different parameters of welfare: per head expenditure, poverty gap and severity of poverty. We also observed the efficiency of households participating in microfinance activities and found that microfinance participation has positive and significant impact on technical efficiency of the households. In the last part of this dissertation, we estimated the impact of microfinance participation on fertilizer use, yield and net returns and found a positive indication of microfinance participation and increased fertilizer use, yield and net-returns. A brief summary of the findings is as follows:

7.2.1 Microfinance and household welfare

Rural areas of developing countries are characterized by poverty and unavailability of resources. Agriculture is the main source of income of most of the population in rural areas. Apart from feeding the country population, the sector provides valuable foreign exchange and contributes largely to the GDP but itself is facing problems like lack of resources specially credit. Microfinance promises the availability of credit to the poor households which are usually neglected by the commercial institutions.

Our research shows that households with higher age and more years of schooling are less likely to participate in microfinance activities because the old ones are less energetic, lack risk bearing capacity and usually restrict themselves to try new innovations whereas the educated ones prefer to enter the services sector. They can have a regular source of income and can make use of their education to improve their skills and earn more. Same is the case with households rich in resources. As they have enough assets to provide to commercial banks or institutions as collateral and can get the bigger loans, so they are less likely to

participate in microfinance programs because of their small scale operations. These findings show that participants of microfinance are resource poor and lack physical assets like land, tractor and cattle.

Moreover we found that presence of factory or mill in the vicinity, presence of output market in the village, and presence of resources have a positive and significant effect on per head expenditure and overall welfare. In general the results reveal that microfinance helps increasing the per head expenditure in case of participants indicating that participants of microfinance spend more on their families, education of the kids and on their food. Microfinance also helps reducing the poverty gap of the households from the poverty line and helps decreasing severity of poverty making participants less poor or getting them out of poverty.

7.2.2 Microfinance and technical efficiency of wheat growers

Pakistan stands in top ten wheat producing countries but cannot fulfill local wheat demand. Wheat is staple food of the country and is imported every year to feed the population. Wheat is cultivated on most of the agricultural area but low yield per acre is a hindrance towards self-sufficiency. The farmers are resource poor, lack of government attention, unavailability of inputs are the major reasons for low productivity.

The results reveal that age and education are important determinants of efficiency. Higher the age, higher is the technical efficiency providing the evidence that aged households have more experience in farming and their experience helps them to achieve higher efficiency

levels as compared to their young counterparts. Similarly, education helps in learning new techniques and innovations and hence may help increasing the efficiency.

Results revealed that microfinance is helping famers to overcome financial constraints and consequently giving access to inputs, making farmers and households technically efficient. Our results show that age, education, fertilizer use, household and farm size have a positive impact on efficiency. Also we found that households participating in microfinance programs are technically more efficient as compared to non-participants.

7.2.3 Impact of microfinance on fertilizer, yield and net-returns

Microfinance helps households to access resources necessary for crop production which consequently increase yield and net-returns. Cotton is an important crop of the country which provides a major share of agriculture GDP and provides raw material to the local textile industry. For the crop apart from other inputs, fertilizer is an important ingredient for the plant production which is usually not easily and readily accessible to farmers because of high prices and sometimes market intermediaries.

Farmers usually have money at the time of crop sale which they utilize in repaying debts and household domestic requirements. Ultimately they have to borrow fertilizer at very high interest rates from input suppliers. Microfinance helps farmers to bridge this gap. With the borrowings from microfinance institutions, households can buy fertilizer at the prevailing market price and can repay their loans easily without being forced to sell their produce at cheap rates.

Our quest in finding relationship between microfinance participation and fertilizer use ended up in a positive impression. We found that households who participate in microfinance programs have tendency to use more fertilizer as compared to non-participants. With the increased application of fertilizer according to the specifications set by agriculture department the households consequently get increased yield and higher net-returns. Moreover the farmers in return of their loans are not compelled to sell their produce to the local lenders at less than open market rates. Thus the results confirm that microfinance participation has a positive and significant impact on fertilizer use, yield and net returns.

7.3 Policy implications

The results of this study propose a number of significant policy implications. Governments and policy makers need to include microfinance, ensuring easy accessible credit facilities at cheap rates in their development plans for the rural households.

There is a need to improve the infrastructure in the villages and country sides enabling farmers to buy inputs for their crops and sell their produce. Government intervention is utmost necessarily required in this matter. Establishment of input and output markets is radical for the development of rural population. Also there is need to regulate the prices in order to make farmers economically better off which will also serve as a motive to get higher production from the available resources which can ultimately add to the overall economy.

Apart from these, an important one is the government intervention in the credit market. Commercial banks, financial institutions should be made bound to entertain small

customers at least a proportion of their regular and richer customers. Governments themselves need to take initiative to provide funding to the formal credit institutions to start microfinance programs under poverty reduction or community welfare motive. The existing microfinance institutions and NGOs should be encouraged to help more and more poor getting them out of poverty and vulnerability.

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Appendix A

Questionnaire for PhD Research on:
"Microfinance and Rural Household Welfare in Pakistan:
An Empirical Investigation"
Department of Food Economics and Consumption Studies,
Christian-Albrechts-Universität zu Kiel,
Germany.

INSTRUCTION TO ENUMERATOR: The RESPONDENT will be a farmer from either of four districts (Muzaffargarh, D G Khan, Rajanpur and Lodhran) in Punjab. Introduce the survey and its objective to get information from clients which will be used to estimate the impact of microfinance services in the study area. Get the name of the person to be interviewed and establish rapport during the interview and assure that information provided will be used for research purposes only, and shall be kept strictly confidential.

Questionnaire No. : _____

Date of Interview : _____

Name of Respondent : _____

Address : _____

District : _____

Tehsil : _____

Village : _____

Section A: Locational Information

Availability of

	Yes(✓)/No(×)	Distance (Km)		Yes(✓)/No(×)	Distance (Km)
Commercial Bank			Hospital		
Agri. Bank			Veterinary Centre		
MFI			Milk Collection Centre		
NGO			Factory/ Mill		
Boys School			Agri. Extension Office		
Girls School			Electricity		
Input Market			Drinking water		
Output Market			Nearest city		
Road					

Section B: Personal Information

1. Name of Borrower _____
2. Education (Years): _____
3. Age (Years): _____
4. Farming Experience (Years): _____
5. Gender: ☐ 1 Male ☐ 2 Female
6. Civil Status: ☐ 1 Single ☐ 2 Married ☐ 3 Separated ☐ 4 Widowed
7. Age of Spouse: _____ (Years)
8. Spouse Education: _____ (Years)
9. Family System: ☐ 1 Joint ☐ 2 Nuclear
10. Number of dependents: _____
11. Number of children (Less than 14 years): _____
12. Number of adults (14-65 years): _____
13. Number of adults (above 65 years): _____
14. Handicap in the family: _____
15. No. Age Schooling Participation in OFP* Participation in OFP**
    1. _____ _____ _____ _____
    2. _____ _____ _____ _____
    3. _____ _____ _____ _____
    4. _____ _____ _____ _____
    5. _____ _____ _____ _____

    *OFP: On Farm Practices **NFP: Non Farm Practices (taken in years)
13. Residential House/Land:

☐1 Owned/inherited ☐2 Rented ☐3 Landlord ☐4 Mortgaged

Section C: Credit Information

1. Have you/ family member ever borrowed? ☐1 Y ☐2 N (if N go to…….)
2. If Y, then since _____ years.
3. Purpose of borrowing: ☐1 Crop production ☐2 Food & daily needs ☐2 Emergency needs
   ☐3 Buy land ☐4 Education ☐5 Machinery/Tools/Equipments ☐6 Housing/repair
   ☐7 Business ☐8 Marriage/Funeral ☐9 Any other, _____
4. Source of borrowing: ☐1 Formal ☐2 Informal ☐3 Both Formal + Informal
5. Formal source: ☐1 NGO ☐2 Commercial Bank ☐3 Agri. Bank
   ☐4 MFI ☐5 Name of source: _____
6. Informal Source: ☐1 Friends/Relatives ☐2 Input supplier ☐3 Landlord ☐4 Local lender ☐5 Commission Agent ☐6 Any other, _____
7. Processing time: ☐1 Formal loan _____ (days) ☐2 Informal loan _____ (days)
8. Does loan have ☐1 Voluntary saving component ☐2 Compulsory saving component?
9. Type of loan: ☐1 Individual ☐2 Group
10. Loan amount: _____ (Rs.)
11. How the loan amount is determined? _____
12. Maturity: _____ (Months)
13. Markup rate: _____ (% per annum)
14. Any other fee/charges: _____
15. Any payment in kind? _____
16. Did you socially/politically approach loan officer? ☐1 Y ☐2 N
17. If Y, the result: _____
18. Repayment period: _____ (months)
19. Repayment mode: ☐1 Monthly ☐2 Quarterly ☐3 Yearly ☐4 Any other, _____
20. Loan repayment method: ☐1 Group / centre collection ☐2 Individual collection through collectors ☐3 Payment to MFIs bank account ☐4 Counter payment to MFI
    ☐5 Any other, _____

21. Do you have to travel for repayment of installment? ☐1 Y ☐2 N, if Y, _____ km in _____ time and spend _____ Rs. as fare.
22. Loan repaid in time? ☐1 Y ☐2 N
23. If N, the reason _____
24. Collateral: ☐1 Mortgage ☐2 Pledge of an asset ☐3 Guarantee of an institution ☐4 Group guarantee ☐5 Personal Guarantee ☐6 Post dated cheques
    ☐7 Assignment of standing crop ☐7 Any other, _____ ☐8 No collateral required
25. If 2, then ☐1 Fixed amount with minimum ☐2 Percentage of loan amount ☐3 Any other, _____
26. Frequency of voluntary savings: ☐1 Monthly ☐2 Quarterly ☐3 Half yearly ☐4 Yearly
    ☐5 Any other, _____
27. What documents you needed for the loan?
    ☐1_____ ☐2_____ ☐3 _____ ☐4_____
    ☐5_____ ☐6_____ ☐7 _____ ☐8_____
28. Was loan sufficient? ☐1 Y ☐2 N
29. Needed more loan? ☐1 Y ☐2 N
30. Was loan helpful? ☐1 Y ☐2 N
31. Who borrows money (signs loan agreement)? ☐1 Wife ☐2 Husband ☐3 Wife+ Husband ☐4 any other family member ☐5 Any other, _____
32. Who manages money after borrowed? ☐1 Wife ☐2 Husband ☐3 Wife+ Husband ☐4 any other family member ☐5 Any other, _____
33. Who manages money other than borrowed? ☐1 Wife ☐2 Husband ☐3 Wife+ Husband ☐4 any other family member ☐5 Any other, _____
34. Who is responsible for the repayment? ☐1 Wife ☐2 Husband ☐3 Wife+ Husband ☐4 any other family member ☐5 Any other, _____
35. Do loan officers/ local lenders explain terms and conditions of loan? ☐1 Y ☐2 N
36. Do loan officers/ local lenders give you a copy of terms and conditions? ☐1 Y ☐2 N
37. Do terms of loan include insurance? ☐1 Y ☐2 N

38. If Y, type, ☐1 Death & accidental ☐2 Medical & hospitalization
    ☐3 Loss of crop/ livestock ☐4 Any other: _____
39. Insurance payment ☐1 deducted from loan proceeds ☐2 included in amortization
    ☐3 paid up front ☐4 any other: _____
40. How many times did you get loan in previous five years? _____
41. Did you ever sell your assets to repay loan? ☐1 Y ☐2 N
42. If Y, what did you sell? _____
43. Were sale proceeds enough to repay? ☐1 Y ☐2 N
44. What are the main constraints for borrowing?
    ☐1 Group lending ☐2 Complicated procedure ☐3 High markup rates
    ☐4 Lack of information ☐5 Compulsory savings ☐6 Collateral
    ☐7 Short repayment periods ☐8 Crop failure ☐9 Risk of default
    ☐10 Access to MFIs ☐10 Any other: _____
45. Did you ever apply for loan and your application was rejected?
46. What was the reason for rejection?
    ☐1 _____ ☐2 _____ ☐3 _____
    ☐4 _____ ☐5 _____ ☐6_____

Section D: Ownership of valuables/resources

Items	Yes(✓) /No(×)	No. / Value	Items	Yes(✓)/ No(×)	No. / Value	Items	Yes(✓)/ No(×)	No. / Value
Land (Acre)			Motorbike			Fodder Cutter		
Fixed Deposit			Bicycle			Sprayer		
Cows/Buffs			Tube-well			TV		
Goat/Sheep			Thresher			Radio		
Horse/Donkey			Leveler			Mobile Phone		
Oxen			Cultivator			Refrigerator		
Tractor			Rotavator			Washing machine		
Trolley			Ridger			Sewing machine		
Car/Jeep			Cotton Drill					

Section E: Land use information

1. Land rent per year if land is rented in or out _____ (Rs.)
2. Owner's share if shared in or shared out _____ (%/y)
3. Is landlord residing in the same village? ☐1 Y ☐2 N
4. No. of years under contract _____
5. No. of times contract renewed _____
6. Composition of farming unit

Owned		Leased/ rented		Shared		Total Cultivated		Distance (Km)
Cultivated	Non-Cultivated	Cultivated	Non-Cultivated	Cultivated	Non-Cultivated	Irrigated	Non-irrigated	

7. Source of irrigation: ☐1 Canal ☐2 Tube-well☐3 Canal + Tube-well ☐4 Any other, _____
8. Area under crops:

Crops	Area
Wheat	
Cotton	
Sugarcane	
Rice	
Vegetables	
Fodder	
Other	

Orchard	Area

Livestock	Area

Section F: Income from different sources

1. Agri wages: _____ (Rs./month)
2. Business: _____ (Rs./month)
3. Non-farm wages/ employment: _____ (Rs./month)
4. Remittances: _____ (Rs./month)
5. Rent: _____ (Rs./month)
6. Pension: _____ (Rs./month)
7. Social security / Zakat: _____ (Rs./month)
8. Any other, _____ (Rs./month)

9. Income from crops:

Crop 1. Wheat					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Leveling	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting	Hours				
Threshing	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income (Grain)	Rs.				
Gross income (Straw)	Rs.				
Net income	Rs.				

Crop 2. Cotton					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Leveling	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Picking	Hours				
Cutting of sticks	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income (Fiber)	Rs.				
Gross income (Sticks)	Rs.				
Net income	Rs.				

Crop 3. Sugarcane					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting	Hours				
Threshing	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income (Cane)	Rs.				
Gross income (Top)	Rs.				
Net income	Rs.				

Crop 4. Rice					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Raising Nursery					
Seeed	Kg.				
Nursery bed preparation	Day				
Nursery maintenance	Day				
Nursery pulling/ transport	Day				
Transplanting	Day				
Capital Inputs Cost					
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting	Hours				
Threshing	Hours				
Cleaning	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income (Paddy)	Rs.				
Gross income (Straw)	Rs.				
Net income	Rs.				

Crop 5. _____					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Leveling	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting	Hours				
Threshing	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income	Rs.				
Net income	Rs.				

Crop 6. _____					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Leveling	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting	Hours				
Threshing	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income	Rs.				
Net income	Rs.				

Income from Orchard

Orchard 1 _____					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting/ picking	Hours				
Packing	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income	Rs.				
Net income	Rs.				

Orchard 2 _____					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting/ picking	Hours				
Packing	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income	Rs.				
Net income	Rs.				

Income from vegetables

Vegetable 1 _____					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Leveling	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting/ picking	Hours				
Packing	Hours				
Transporting	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income	Rs.				
Net income	Rs.				

Vegetable 2 _____					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Leveling	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting/ picking	Hours				
Packing	Hours				
Transporting	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income	Rs.				
Net income	Rs.				

Vegetable 3 _____					
Item	Units	Units/ Acre	Cost/ Unit	Cost/ Acre	Total Cost
Land Preparation Cost					
Ploughing	No.				
Planking	No.				
Leveling	No.				
Capital Inputs Cost					
Seed	Kg.				
FYM	Carts				
Fertilizers					
Urea	Bags				
DAP	Bags				
Nitro Phos	Bags				
SSP	Bags				
Any other					
Chemicals					
Insecticides	Liter				
Pesticides	Liter				
Any other					
Labor Cost					
Cultural practices	Hours				
Harvesting/ picking	Hours				
Packing	Hours				
Transporting	Hours				
Other Costs					
Land tax	Rs.				
Land rent	Rs.				
Water charges	Rs.				
Marketing cost	Rs.				
Management charges	Rs.				
Markup on investment	Rs.				
Total Cost	Rs.				
Income					
Gross income	Rs.				
Net income	Rs.				

10. Income/Expenditure from livestock and poultry

Items	Quantity sold last year		Quantity consumed last year		Quantity purchased last year	
	Units	Price	Units	Price	Units	Price
Cow/Buff						
Ox						
Goat/sheep						
Milk						
Ghee/Oil						
Hens						
Eggs						
FYM						

11. Other livestock expenditure:
    - 11.1 Medicine: _____
    - 11.2 Vaccination: _____
    - 11.3 Food supplements: _____
    - 11.4 Labor: _____
    - 11.5 Other: _____

Section G: Household expenditure

Type of Expenditure	Annual Expenditure	Type of Expenditure	Annual Expenditure
Children Schooling		Fuel	
Food Items		Electricity	
Clothing		Cooking	
Health		Repair/ maintenance	
Marriage/ funerals		Donations/ Zakat	
Health Insurance		Tobacco	
Recreation		Other (if any)	

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Academic Record

1995-1996	**Matriculation.** Punjab, Pakistan.
1997-1998	**Intermediate.** Punjab, Pakistan.
1998-2002	**B.Sc. (Hons.) Agriculture.** University of Agriculture, Faisalabad, Pakistan.
2002-04/05	**M.Sc. (Hons.) Agricultural Economics.** University of Agriculture, Faisalabad, Pakistan.

Professional Career

2004–2005	The Bank of Punjab, Rural Finance Department.
2005–2005	Department of Agriculture, Govt. of Punjab. Pakistan.
2005–2011	Habib Bank Limited, Commercial Lending Group.

Publications

- Makhdum, M. S. A. and Ashfaq, M. (2008). An Economic Evaluation of Negative Impact of Water-logging and Salinity on Wheat Productivity. Journal of Soil & Environment 27 (1) 112-115.
- Kousar, R., Makhdum, M. S. A., Yaqoob, S. and Saghir, A. (2006). Economics of Energy Use in Cotton Production on Small Farms in Distt. Sahiwal, Punjab, Pakistan. Journal of Agriculture and Social Sciences 02 (4) 219-221.

Research Projects

- Research project and report on "Water Distribution and Productivity on Private Mini Dam in Rainfed Pothwar, Gujar Khan Distt. Rawalpindi." At National Agriculture Research Centre, Islamabad (01-06-2002 to 20-08-2002).
- Research Project and Thesis on "Negative Externalities of Water Infrastructure: Water logging and Salinity and its impacts on Wheat Productivity, A case study of Distt. Muzaffargarh." At University of Agriculture, Faisalabad (2002 to 2004).
- PhD research project, "Microfinance and Rural Household Welfare in Pakistan: An Empirical Investigation." (2011-2016)

Internship

- Internship as a research fellow at National Agriculture Research Centre (NARC), Islamabad, Pakistan (01-06-2002 to 20-08-2002).